



CANADA NICKEL
COMPANY



Stantec

Crawford Nickel Project Impact Statement

Chapter 5 Alternatives Assessment



Prepared for:
Canada Nickel Company

September 30, 2024

Prepared by:
Stantec Consulting Ltd.

Table of Contents

5	Alternatives Assessment	5.1
5.1	Alternatives to the Project	5.1
5.2	Alternative Means Approach.....	5.3
	5.2.1 Overview.....	5.4
	5.2.2 The Influence of Consultation and Engagement on the Assessment	5.15
	5.2.3 Long List of Alternative Means	5.19
5.3	Alternative Means of Carrying Out the Project	5.21
	5.3.1 Project Layout, Component Size, and Locations	5.22
	5.3.2 Route or Corridor Options	5.22
	5.3.3 Energy and Power Sources.....	5.42
	5.3.4 Water Supply Sources.....	5.43
	5.3.5 Aggregate Supply Sources.....	5.52
	5.3.6 Water Crossing Structures and Locations.....	5.53
	5.3.7 Water Diversion Alternatives	5.53
	5.3.8 Mining-Related Activities	5.59
	5.3.9 Mine Waste Management	5.60
	5.3.10 Water and Wastewater Management.....	5.62
	5.3.11 Waste Management	5.77
	5.3.12 Decommissioning and Closure.....	5.78
	5.3.13 Workforce Hiring, Scheduling and Accommodation Strategies	5.79
5.4	Summary of the Evaluation of Alternatives	5.87
5.5	References.....	5.89
5.6	Figures	5.90

List of Tables

Table 5.1	List of VCs/Criteria and Indicators	5.8
Table 5.2	Summary of Key Information, Indigenous Knowledge, and Concerns for the Project Related to Alternatives Assessment.....	5.16
Table 5.3	Long List of Candidate Alternative Means.....	5.19
Table 5.4	Corridor Comparative Analysis.....	5.26
Table 5.5	Transportation of Concentrate from Site Comparative Analysis	5.31
Table 5.6	Site Access Comparative Analysis	5.39
Table 5.7	Potable Water Supply Comparative Analysis	5.45
Table 5.8	Process Plant Water Supply Comparative Analysis.....	5.50
Table 5.9	North Driftwood Diversion Comparative Analysis	5.56
Table 5.10	Domestic Sewage Waste Comparative Analysis	5.64
Table 5.11	Water Treatment Technology Comparative Analysis	5.68
Table 5.12	Discharge Points Comparative Analysis (During Operations).....	5.75
Table 5.13	Accommodations Comparative Analysis	5.83
Table 5.14	Summary of Preferred Alternative Means	5.88

List of Figures

Figure 5.1	Alternatives Evaluation Process Flow Chart	5.91
Figure 5.2	Highway, Transmission Line, and Rail Spur Corridor Alternatives	5.92
Figure 5.3	Site Access Alternatives	5.93
Figure 5.4	Aggregate Supply Sources Alternatives	5.94
Figure 5.5	North Driftwood River Diversion Alternatives	5.95
Figure 5.6	Effluent Discharge Points during Operations.....	5.96

Acronyms/Abbreviations

CO ₂	carbon dioxide
ECCC	Environment and Climate Change Canada
GHG	greenhouse gas
IAA	<i>Impact Assessment Act, 2019</i>
IAAC	Impact Assessment Agency of Canada
IPT	In Process Tailings
kV	kilovolts
LSA	Local Study Area
MNR	Ministry of Natural Resources
MTO	Ministry of Transportation
ONR	Ontario Northland Railway
PA	Project Area
RSA	Regional Study Area
SMR	small modular reactor
TIS Guidelines	Tailored Impact Statement Guidelines
TMF	Tailings Management Facility
TSS	total suspended solids
VC	Valued Component

5 Alternatives Assessment

Consideration of alternatives to the Crawford Nickel Project ('the Project'), as well as alternative means for carrying out the Project that are technically and economically feasible, and the environmental effects of any such alternative means must be considered under section 22(1) (e) and (f) of the *Impact Assessment Act* (IAA) and in accordance with the Tailored Impact Statement Guidelines (TIS Guidelines). Consideration of alternatives is also required under the provincial Class Environmental Assessment (Class EA) process for some individual Project components.

The following sections describe the methods used to identify and evaluate alternatives to the Project and the alternative means for the various Project components to meet the requirements of the IAA and the requirements of the applicable Class EAs under the *Environmental Assessment Act*, 1990. This section also identifies and evaluates the potential environmental, health, social, and economic effects, and the potential effects on the rights of Indigenous Peoples of alternative means of carrying out the Project that are technically and economically feasible and provides rationale for the preferred alternatives.

Guidance used to inform this assessment was obtained through a review of the following Agency guidance documents:

- Guidance: "Need for", "Purpose of", "Alternatives to" and "Alternative Means" (IAAC 2020)
- Policy Context: "Need for", "Purpose of", "Alternatives to" and "Alternative Means" (IAAC 2020)

5.1 Alternatives to the Project

The IAA and TIS Guidelines require the consideration of "alternatives to" the project that are technically and economically feasible to meet the project need and achieve the project purpose. Chapter 4 provides a description of Project need and purpose from the perspective of Canada Nickel Company (Canada Nickel).

'Alternatives to' the project are functionally different ways to meet the need for the project and achieve its purpose that are technically and economically feasible. The 'alternatives to' assessment compares a designated project to other technically and economically feasible ways to meet a project's need and achieve its purpose.

Canada Nickel has identified a business case that supports the development of the Project based on forecasted demand for critical minerals (specifically nickel), the strategic need for critical minerals in Canada (Natural Resources Canada 2021) and Ontario (Ministry of Energy Northern Development and Mines 2022) and the plausible destinations for mining products within the North American market. The Project also provides the opportunity to generate employment opportunities, generate tax revenue, and to support the established mining sector in northern Ontario.

The principal advantages and benefits associated with the Project, in addition to addressing Project need, are primarily socio-economic in nature. The Project would generate economic activity and opportunities in the area, including but not limited to, the creation of direct and indirect jobs, direct and indirect business opportunities, household income, training opportunities, tax revenue, and increased gross domestic product. Such positive effects would benefit the local economy, where unemployment rates (8.8% in 2021) are above the provincial average (8.0% in 2021) and where the qualified workforce is/may be underemployed as a result of potential forthcoming mine closures in the area. Additional positive effects would be felt at the provincial and national levels through the supply of critical minerals to the North American market to reduce reliance on overseas resources. The various Project benefits are anticipated to be realized by Indigenous and non-Indigenous community members, with Indigenous nations benefiting through opportunities to establish Impact and Benefit Agreements with Canada Nickel. Given that this Project is long-lived (i.e., operational for more than 40 years), Project economic benefits would be realized immediately and over the life of the Project. In addition to socio-economic benefits, the carbon sequestration potential is a benefit of the Project that helps Canada's ability to meet its climate change commitments (see Chapter 32 of the Impact Statement).

Should the Project not proceed, such advantages/benefits would not accrue from the 'Do Nothing' (no action) alternative, since it represents the status quo. While potential adverse effects on the environment will be avoided under this scenario, the degree and extent of which are assessed in Chapters 10 through 23, failing to proceed with the Project would result in unrealized benefits and use of an existing resource for which global demand exists. It is also noted that the 'Do Nothing' alternative does not meet the purpose of the Project as stated by Canada Nickel (see Chapter 4, Section 4.1).

The 'Do Nothing' (no action) alternative represents the scenario in which the Project is not pursued and, therefore, existing conditions for Valued Components (VCs) will continue (see Chapter 9 – Description of Existing Environment, for details on existing conditions). Under this alternative:

- **Mining Operations:** No mining activities will take place in the proposed area. The land will remain in its current state, and mineral resources will not be extracted; however, mineral exploration activities are likely to continue
- **Environmental Impact:** There will be no Project-related adverse environmental effects, such as wildlife habitat disturbance/clearing, alterations to fish habitat, or discharges to waterbodies; however, existing forestry practices (logging, clearing, forestry road development) along with existing recreational activities are likely to continue
- **Social and Economic Impact:** Local communities will not experience Project-related changes or disruptions. In cases where Indigenous nations were considering economic participation in the Project, potential benefits will not materialize. Project-related opportunities in terms of employment and income generation will not be realized
- **Revenues and Expenditures:** There will be no Project-related contributions to local/regional businesses (Indigenous and non-Indigenous) nor would there be Project-related contributions to the provincial or federal economies and the generation of tax revenues associated with the Project (e.g., federal and provincial corporate income tax, personal income tax, and sales tax),

the direct portion of which is estimated to be approximately \$4B (see Economic Impact Assessment, Appendix C.10)

- **Resource Utilization:** The mineral resources in the area will remain untouched
- **Carbon Sequestration:** The opportunity to sequester carbon through the In Process Tailings Carbonation Process, including the carbon dioxide (CO₂) sequestration that occurs naturally in brucite and the enhanced carbon sequestration potential of the tailings, will be lost

Given that the Project is a mining operation, alternatives to the Project are limited by the fact that the Project can only be carried out at sites where the resource exists. In fact, there are no alternatives to development of the Project that meet the needs of Canada Nickel, particularly given the growing interest in critical minerals for the battery and stainless-steel markets.

5.2 Alternative Means Approach

'Alternative means' are the various technically and economically feasible ways, including through the use of best available technologies that would allow a designated project and its physical activities to be carried out. 'Alternative means' can include options for locations, development/and or implementation methods, routes, designs, technologies, and mitigation measures, and includes both short-term and lasting positive and adverse effects of the project.

Section 4.4 of the TIS Guidelines states that the alternative means analysis must address key Project elements, including but not limited to the following, where relevant to the Project:

- Project layout and/or component size and locations
- route or corridor options for:
 - relocation of Highway 655 and 500 kilovolt (kV) transmission line
 - transportation of freight and product to and from site (e.g., road or rail transportation), and
 - other linear Project components (e.g., any access roads, haul roads, overpasses, transmission lines, pipelines)
- energy and power sources (temporary and permanent, stationary and mobile)
- water supply sources (potable and industrial, surface water and groundwater)
- aggregate supply sources (e.g., location of dedicated sources and/or suppliers)
- water crossing structures and locations
- water diversion routes
- mining-related activities:
 - mining operations (Open Pit or underground, staging), and
 - processing facilities location and design (comminution, separation, concentration and dewatering)

- mine waste management (tailings, waste rock, pit walls, overburden, low-grade ore):
 - storage, management, and re-use of excavated materials. For instance, segregation of waste rock into different piles based on potential for acid rock drainage and metal(loid) leaching; pit wall management for acid rock drainage and metal(loid) leaching; overburden and soil re-use
 - location of mine waste facilities in consideration of groundwater flow directions, any local groundwater users, nearby rivers, lakes, and wetlands
 - tailings storage methods. For instance, conventional slurry, thickened, or filtered tailings; co-disposal versus separation of acid-generating and metal(loid) leaching tailings
 - management of tailings and waste rock on the surface versus backfilling into the Open Pit during decommissioning
 - tailings management techniques to improve carbon sequestration
- water and wastewater management:
 - location of effluent discharge points (including temporary discharge locations during the construction phase, and ongoing discharge locations during operations, as well as potential locations following decommissioning as needed), taking into account predicted water quantity changes)
 - treatment technologies and techniques to control effluent quality
 - water re-use
- waste management (e.g., landfills, disposal facilities)
- timing options for components and phases of the Project
- suspension, decommissioning, or abandonment options
- workforce hiring, scheduling and accommodation strategies

Each option for the alternative means identified above is described in the following sections and summarized in a table. Where only a single feasible alternative means was identified, a summary of the rationale for this decision is included. Where a range of alternatives was considered, a comparison evaluation based on potential environmental effects, and technical and economic feasibility of each alternative means is summarized.

5.2.1 Overview

The process to identify and evaluate a reasonable range of 'alternative means' of carrying out the Project involved a three-step evaluation process. The evaluation process used progressively more technical detail at each stage to narrow the range of alternatives and ultimately select a preferred 'alternative means' for each Project component. The process included the following steps:

Step 1 - Initial Screening of 'Alternative Means'

- Identify and describe candidate alternative means (i.e., those that may be technically and economically feasible) to carry out the various components of the Project
- Assess the candidate 'alternative means' and eliminate those 'alternative means' that are not technically and/or economically feasible (i.e., those with fatal flaws) and describe the rationale for this conclusion, whereby:
 - Technical feasibility considers factors that could influence the safe, reliable, and efficient operations. Technology must be available and proven for use in a similar environment and activity set and cannot compromise personnel and process safety for it to be considered
 - Economic feasibility considers capital and operational costs/Project expenditures. Project expenditure may be impacted directly (e.g., equipment and personnel requirements) and indirectly (e.g., schedule delays)
- Where multiple technically and economically feasible alternative means are identified following Step 1, a short list of alternatives is brought forward for further detailed consideration in the next steps

Step 2 – Examination of Potential Effects on Valued Components

- Identify key VCs potentially affected by each 'alternative means'
- Briefly examine the potential effects on the VCs for each 'alternative means'. A full assessment of environmental effects is not necessary at this step. The intent is to develop an understanding of potential environmental effects of the alternative mean under consideration to inform the comparative analysis

Step 3 - Comparative Analysis of 'Alternative Means' and Selection of Preferred Alternative

- Complete a comparative analysis of alternatives based on the potential for environmental effects of the technically and economically feasible 'alternative means'
- Select preferred alternative for carrying out the Project

An overview of the alternative evaluation process is shown on Figure 5.1. In some cases, a preferred alternative means was identified at the completion of Step 1, where only one technically and economically feasible alternative was identified for a Project component. In such a case, no comparative analysis was required. Where the initial screening identified multiple alternatives that were technically and economically feasible, a comparative analysis was undertaken to select a preferred alternative mean for carrying out the Project.

The alternatives assessment process uses a conceptual level of detail necessary to distinguish one alternative from another, including an assumption that standard mitigation measures would be applied to each alternative. It is assumed that requirements associated with effectively managing the potential for effects for each Project component would be implemented, including finalizing Project design in accordance with regulatory standards, guidelines and guidance, ongoing monitoring for effectiveness and compliance where appropriate, and developing follow-up programs to address issues that may arise

during the Project. Such requirements are not developed in detail as part of the alternatives assessment, though mitigation measures are described as they apply to each VC in Chapters 10 to 23.

The alternatives assessment process involved developing an understanding the alternatives for each Project component to a level of detail that allowed for a clear determination of the advantages and disadvantages of each ‘alternative means’ of carrying out the Project compared with the other ‘alternative means’ being considered. As stated in Section 4.4 of the TIS Guidelines, the Impact Statement must describe

“the preferred means of carrying out the Project and the rationale for the selection based on the consideration of environmental, health, social and economic effects, the impacts on the rights of Indigenous peoples, technical and economic feasibility, and the use of best available technologies, and consideration of the sustainability principles”.

Once a preferred alternative was selected for each Project component, the technical details for the preferred alternative were refined through additional engineering and design work (Chapter 3), which informed the environmental effects assessment in the subsequent stage of the assessment, as described in Chapter 8 (Assessment Methodology).

The alternative assessment process has also been confirmed and refined in consultation with the public, stakeholders, government agencies and Indigenous nations. Section 5.2.2 describes how key input on the alternatives assessment method and results influenced the Impact Statement.

Following the selection of a preferred alternative for each Project component, the Project description was finalized, and a more detailed assessment of overall Project effects was completed as presented in the subsequent chapters of the Impact Statement.

5.2.1.1 Initial Screening of Alternative Means

Step 1 of the alternatives assessment involved the identification and screening of alternative means to confirm a range of technically and economically feasible alternatives for further consideration in the Impact Statement.

The technical and/or economic feasibility criteria included the following:

- Financial Costs: Alternative does not result in prohibitively high capital costs (e.g., equipment purchase, installation, erection and/or construction) and operating costs (e.g., reagents, consumables, water management and treatment, maintenance costs, electrical power costs, operating time/operating risks, labour requirements)
- Constructability: Alternative is constructable while avoiding undue or unnecessary design constraints
- Proven Technology: Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program
- Safety: Alternative can be safely constructed and operated

While all these criteria inform whether an alternative would be considered technically and economically feasible, the criteria are typically prioritized so that clearly unsuitable alternatives are quickly eliminated from further consideration. While an alternative may be considered technically or economically feasible when evaluated against a single criterion in isolation, poor ranking in relation to two or more criteria can combine to render an alternative technically and/or economically unfeasible. For example, an alternative that would incur some incremental costs associated with more extensive tree cutting and land clearing requirements might be economically feasible if that were the only factor compromising feasibility, but when combined with higher costs arising from another criterion, such as greater cut and fill requirements and associated costs, it would be rendered an unfeasible alternative.

The Project team brought forward into the comparative analysis those alternatives with substantial merit and possibility for implementation, and eliminated those with flaws that would ultimately affect the overall ability to implement the Project. The identification of flaws included consideration that each alternative would be implemented by applying reasonably feasible mitigation measures based on industry standards, and relevant regulatory requirements or guidelines (e.g., highway alternatives are assumed to include appropriate stormwater management features to manage water quality and quantity; effluent treatment is expected to meet regulatory standards for discharge).

In the initial screening, the Project team considered the design of Project components and how alterations to location, technology and mitigation measures might affect overall potential effects. Only alternatives that presented substantially different ways of approaching the design of a Project component were identified for the initial screening to avoid comparing non-differentiated 'alternative means'.

In some cases, alternatives were defined based on a qualitative description, but where design differences were substantial enough to alter the potential effects of a Project component, conceptual alternatives were developed using mapping to better define alternative locations and footprints. For example, different corridor alternatives for Highway 655, the transmission line and rail spur, different locations for mine waste disposal and North Driftwood River Diversion Channel were developed that could have substantially different effects on the environment.

Where multiple potentially feasible alternatives for a Project component were identified as part of the initial screening, these were brought forward to the comparative analysis. If only a single feasible alternative mean for a Project component remained based on the results of the initial screening, the comparative analysis step was not applied, and the remaining alternative was considered preferred and brought forward into the Project Description (Chapter 3) and environmental effects assessment as presented in the subsequent chapters of the Impact Statement.

5.2.1.2 Examination of Potential Effects on Valued Components

Prior to the comparative analysis, the potential effects of Project components on the natural, social, economic, and health components of the environment, as well as on Indigenous nations, are considered against the comprehensive set of VCs, as appropriate. This consideration provides a high-level description of the types of potential effects that may occur during construction and operations to inform the comparative analysis.

The term ‘VCs/criteria’ is used to describe the categories that were assessed in the comparative analysis, and the term “indicators” is used to describe the potential effects of each alternative on the ‘VCs/criteria’ for the comparative analysis. The ‘VCs/criteria’ list includes environmental, health, social and economic components, which are identified to align with the VC Chapters (Chapters 10 to 23) in the Impact Statement.

In addition, technical and economic considerations, including financial costs, constructability, proven technology, and safety, are also included so that comparisons can be made in the next step.

For each VC/criteria considered in determining comparative effects of the various alternatives, Table 5.1 identifies the indicators considered and the rationale for their selection.

Table 5.1 List of VCs/Criteria and Indicators

VC/Criteria	Indicator	Rationale
Natural Environment		
Geology and Geological Hazards	<ul style="list-style-type: none"> • Change in terrain stability 	‘Alternative means’ may affect areas of geological instability and potential for increased landslides and slope erosion.
Soil and Sediment	<ul style="list-style-type: none"> • Change in soil quality 	‘Alternative means’ may result in change to soil in the area and reclamation suitability as a result of admixing, compaction and rutting, as well as wind and water erosion.
	<ul style="list-style-type: none"> • Change in soil quantity 	‘Alternative means’ may result in a change in soil thickness or loss of soil.
Atmospheric Environment	<ul style="list-style-type: none"> • Change in ambient air quality 	The release of air contaminants to the atmosphere related to ‘alternative means’ may affect the quality of the ambient air, adversely affecting human or ecological health (e.g., wildlife or, vegetation) through contact with contaminants, inhalation, and consumption of contaminated food.
	<ul style="list-style-type: none"> • Change in ambient light 	Lighting related to ‘alternative means’ may affect: <ul style="list-style-type: none"> • human health, through changes in nighttime lighting, circadian rhythm, and disruptions to sleep • wildlife from potential interactions with nighttime foraging and migration patterns for bird, fish, mammals, and insects
Acoustic Environment	<ul style="list-style-type: none"> • Change in noise and vibration 	Noise related to ‘alternative means’ may affect the existing acoustic environment resulting in: <ul style="list-style-type: none"> • community annoyance • ecological disturbance Vibration related to ‘alternative means’ may result in: <ul style="list-style-type: none"> • annoyance to nearby receptors associated with ground borne vibration could exceed the perceptibility limit • ecological disturbance
Groundwater	<ul style="list-style-type: none"> • Change in groundwater quantity 	‘Alternative means’ may result in: <ul style="list-style-type: none"> • groundwater withdrawals • change in groundwater-surface water interaction

VC/Criteria	Indicator	Rationale
Groundwater	<ul style="list-style-type: none"> • Change in groundwater quality 	<p>'Alternative means' may result in:</p> <ul style="list-style-type: none"> • changes to groundwater quantity or flow patterns that can in turn affect groundwater quality • groundwater contamination
Surface Water	<ul style="list-style-type: none"> • Change in surface water quantity 	Interactions between 'alternative means' and surface water quantity may result in changes in hydrology and sediment transport regimes due to altered flow.
	<ul style="list-style-type: none"> • Change in surface water quality 	Interactions between 'alternative means' and surface water quality may result in the introduction of sediments and contaminants to waterbodies or change in waterbody processes that can affect water chemistry and stratification.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> • Change in vegetation communities and species diversity 	<p>Vegetation clearing and ground disturbance related to alternative means may affect:</p> <ul style="list-style-type: none"> • native vegetation communities, including ecological communities of management concern • plant species at risk and species of management concern • plant species that have traditionally been used by Indigenous communities <p>Vehicle and equipment movement related to 'alternative means' may affect:</p> <ul style="list-style-type: none"> • vegetation communities arising from the introduction or spread of invasive, noxious, and prohibited noxious species
	<ul style="list-style-type: none"> • Change in riparian function 	Vegetation clearing and ground disturbance related to 'alternative means' may affect riparian areas. Changes in surface water flow may affect riparian function.
	<ul style="list-style-type: none"> • Change in wetland form and function 	Vegetation clearing and ground disturbance related to 'alternative means' may affect wetland area or changes in wetland class. Changes in wetland sediments, surface water flow or vegetation may affect wetland function.
Fish and Fish Habitat	<ul style="list-style-type: none"> • Change in fish habitat (section 35 of <i>Fisheries Act</i>) 	'Alternative means' may result in physical alteration or loss of instream and/or riparian habitat, creation of barriers to fish passage, modification of stream flows or lake levels, or deposition of sediment into habitat important for fish.
	<ul style="list-style-type: none"> • Change in Fish Health (<i>Fisheries Act</i> section 34.4 and <i>MDMER Schedule 5, Part 2</i>) 	'Alternative means' may result in changes in fish health, growth, or survival due to stranding of fish or fish eggs, sound over-pressures, trauma from physical impacts, changes in prey quantity or quality, or acute or chronic toxicological effects from changes in water quality or sediment quality.
Birds and Bird Habitats	<ul style="list-style-type: none"> • Change in habitat 	'Alternative means' may result in direct and/or indirect loss or alteration of bird habitats, including species at risk.
	<ul style="list-style-type: none"> • Change in mortality risk 	Activities associated with 'alternative means' may result in increased mortality risk or number of bird fatalities.

VC/Criteria	Indicator	Rationale
Wildlife and Wildlife Habitat	• Change in habitat	'Alternative means' may result in direct and/or indirect loss or alteration of wildlife habitat, including species at risk.
	• Change in movement	'Alternative means' may result in alteration of wildlife movement patterns (daily, seasonal) or movement corridors. Alteration or impediment of wildlife movement due to physical barriers, sensory disturbance, or vegetation removal (e.g., gaps in forested habitat).
	• Change in mortality risk	Direct and/or indirect activities associated with 'alternative means' may result in increased mortality risk or number of wildlife fatalities.
Wildlife and Wildlife Habitat	• Change in wildlife health	Activities associated with 'alternative means' may result in increased risk of exposure of wildlife to contaminants.
Climate Change	• Change in release of GHG to the environment	Activities associated with 'alternative means' may result in release of direct and indirect GHG emissions
	• Change in carbon capture	Activities associated with 'alternative means' may result in lost and gained sequestration potential from land use change. Activities associated with 'alternative means' may result in capture and storage of CO ₂ through mineral carbonization in tailings and waste rock.
Health	• Change in physical health	Activities associated with 'alternative means' may result in changes in environmental quality, traditional land use, population dynamics, and employment conditions, all of which may affect physical health.
	• Change in mental health and social wellbeing	Activities associated with 'alternative means' may result in changes in environmental quality, traditional land use, population dynamics, and employment conditions, all of which may affect mental health and social well-being through behavioural changes and coping mechanisms.
	• Change in community safety	Activities associated with 'alternative means' may result in changes in environmental quality, traditional land use, population dynamics, and employment conditions, all of which may affect community safety through individual behavioural changes and coping mechanisms.
Social and Economic Conditions		
Services and Infrastructure	• Change in demand for services and infrastructure	'Alternative means' may result in changes in demand for services and infrastructure.
	• Change in accommodation availability	'Alternative means' may result in changes in accommodation availability. The mobile workforce could draw on temporary accommodations (e.g., hotels, motels or campgrounds).
	• Change in demand for transportation infrastructure	'Alternative means' may result in changes in demand for transportation infrastructure. Transportation of construction materials, equipment, and workers could place increased demands on transportation infrastructure.

VC/Criteria	Indicator	Rationale
Land and Resource Use	<ul style="list-style-type: none"> • Change in land use designations and private property 	'Alternative means' may not be compatible with applicable land use plans and zoning and may result in land disturbance effects.
	<ul style="list-style-type: none"> • Change in recreation 	'Alternative means' may affect parks or trails that provide recreation and natural heritage conservation value. 'Alternative means' may impair recreational use activities, visual aesthetics. 'Alternative means' may remove or interfere with a navigable waterway.
Land and Resource Use	<ul style="list-style-type: none"> • Change in resource use 	'Alternative means' may affect resource use activities (i.e., agriculture, forestry, mining). 'Alternative means' may disrupt resource harvesting activities (i.e., hunting, trapping, bait fishing).
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> • Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	'Alternative means' may have potential to permanently remove, disrupt, or displace archaeological resources determined to have cultural heritage value or interest.
Economic Conditions	<ul style="list-style-type: none"> • Change in employment and training 	The direct, indirect and induced employment effects of the 'alternative means' may result in increased employment opportunities, incomes, business activity, and government tax revenues. Increased demand for labour related to 'alternative means' may encourage people who are not otherwise employed or who are not in the workforce to work on the Project. 'Alternative means' may result in reduced availability of skilled labour, goods and services that are required, which can lead to supply issues and cost increases (e.g., wage and price inflation).
	<ul style="list-style-type: none"> • Change in business 	
	<ul style="list-style-type: none"> • Change in provincial economy 	
Indigenous Peoples		
Indigenous Interests	<ul style="list-style-type: none"> • Change to Indigenous and treaty rights (includes Indigenous land and resources use) 	'Alternative means' may result in: <ul style="list-style-type: none"> • alteration of the current and future quality, quantity, or distribution of country foods and other harvested resources (e.g., species of cultural importance, medicinal plants) • alteration of habitat supporting harvested resources • alteration of harvesting methods, timing, or seasonality • alteration of access routes or ability to travel to or through preferred use areas/sites of interest • increased access by non-Indigenous harvesters or land users • disruption of the Indigenous or Treaty rights associated with Project workforce • increased sensory disturbance (e.g., change in noise levels, air quality, traffic) that influences the quality of experience or required conditions for use or access

VC/Criteria	Indicator	Rationale
Indigenous Interests	<ul style="list-style-type: none"> Change in physical and cultural heritage 	<p>'Alternative means' may result in:</p> <ul style="list-style-type: none"> loss or alteration of physical and cultural heritage features, locations, or areas loss or alteration of use, access, value, quality of experience or required conditions (e.g., visual aesthetics, noise levels) of physical and cultural heritage features, locations, or areas loss or alteration of ability to maintain and transmit Indigenous knowledge and culture (e.g., language, histories, stories, practices) to future generations alteration to harvesting, habitation, and cultural or sacred locations or areas
	<ul style="list-style-type: none"> Change to governance, health, social and economic conditions of Indigenous nations 	<p>Alternative means may result in:</p> <ul style="list-style-type: none"> alteration to the current use of lands and resources for traditional purposes (includes harvesting sites, heritage and other sites of cultural sites, and associated traditional activities) alteration of access to land, waterways, waterbodies, and preferred travel ways alteration to decision making abilities regarding land and water, and ability to uphold cultural traditions, laws, and governance systems that inform how rights are exercised disruptions associated with Project workforce alteration to subsistence-based livelihoods alteration to demands on community services alteration to Indigenous economic activities
Technical / Economic		
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	'Alternative means' will have different associated costs relevant to economic feasibility of the Project.
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints 	Constructability of 'alternative means' can affect the Project's technical and economic feasibility.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program 	Increased reliability and reduced risk are associated with proven technologies, with best available technology being preferred over others.
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated 	The safety of 'alternative means' can affect technical feasibility as well as economic feasibility (depending on additional effort to make an alternative safe).

5.2.1.3 Comparative Analysis of Alternative Means

Potential 'alternative means' carried forward to the comparative analysis were compared against a range of criteria to identify the preferred means for each Project component.

The comparative analysis process was based on the 'VCs/criteria' list as well as the technical and economic considerations, identified in Table 5-1 and supported with baseline information obtained and studies undertaken as part of the assessment process, which cover a wide range of data sources. Information from design and engineering work undertaken by Canada Nickel was used to inform the construction and operational needs of the Project. This information was used to define the scope of potential 'alternative means' and to predict the potential for positive and negative effects of each alternative on the 'VCs/criteria'.

Both quantitative and qualitative predictions were used to identify the potential effects for each indicator under the alternative being assessed, and considered for each Project phase (construction, operations, and closure). A comparative evaluation was then completed to establish the relative advantages and disadvantages of each alternative based on the following process:

- Consider how each alternative would conceptually be implemented at a level of detail necessary to distinguish each alternative from the others (including as appropriate: location, nature of disturbance to the landscape, potential for emissions/discharge assuming the application of standard mitigation measures, etc.)
- Characterize the potential for effects of each alternative based on expected potential for emissions, discharges or disturbance during each phase of the Project (construction, operations, and closure). The interactions of various 'VCs/criteria' were considered at a conceptual level
- Compare the potential for effects of each alternative on each 'VC/criterion' through the indicators to determine which alternatives represent advantages or disadvantages in relation to the others
- Select a preferred alternative based on measuring the greatest balance of advantages to disadvantages of each alternative (in most cases this is a simple comparison of which alternative demonstrates the most advantages, though in some cases further rationale may be applied to confirm a particular selection)

The detail required for a conceptual understanding of alternatives varies depending on the overall potential for effects. For instance, a higher level of detail regarding location and dimensions was developed for Project components with the potential for greater effects on the local landscape and the overall Project Area (PA), such as the Impoundment Facility, Tailings Management Facility (TMF) and Highway 655 realignment. For Project components with less potential for effects or where options are limited, such as the location of the Process Plant, more general assumptions about potential designs were made to inform the evaluation process.

The comparative ranking of each alternative for each 'VC/criterion' and indicator was determined as outlined below:

- Major Advantage– the alternative will result in substantially more positive effects or fewer negative effects compared with other alternatives
- Advantage – the alternative will result in moderately more positive effects or fewer negative effects compared with other alternatives

- Neutral – the alternative does not demonstrate a measurable difference in positive or negative effects compared with other alternatives
- Disadvantage – the alternative will result in moderately more negative effects or fewer positive effects compared with other alternatives
- Major Disadvantage – the alternative will result in substantially more negative effects or fewer positive effects compared with other alternatives

The Project team considered the anticipated positive and adverse effects for each alternative related to each indicator. The key advantages and disadvantages identified through the ranking of the 'VCs/criteria' were then summarized to identify an overall ranking of 'Preferred' or 'Not Preferred' for each 'alternative mean' for that particular Project component.

Except for the prescribed process for the TMF and Impoundment Facility alternatives assessments (see Section 5.2.1.4), a weighting approach was not required for the 'VCs/criteria', as the overall balance of advantages for each Project component was a transparent means to focus the comparative analysis to arrive at a clear conclusion for the preferred alternative. The preferred alternative for each component of the Project was confirmed based on this overall assessment of 'VCs/criteria' to identify advantages and disadvantages.

The 'Preferred means' of carrying out each component was selected by Canada Nickel and incorporated as part of the Project (see Chapter 3) and becomes the focus of the assessment in the Impact Statement. The VCs applied to the comparative analysis link directly with the VCs considered in the effects assessment in Chapters 10 to 23.

5.2.1.4 Special Considerations for Mine Waste Disposal

The TIS Guidelines require that, for mine waste management facilities, the assessment of alternatives is undertaken in accordance with the Environment and Climate Change Canada's Guidelines for the Assessment of Alternatives for Mine Waste Disposal (ECCC 2013).

The process for the mine waste disposal alternatives assessment included the following steps, generally in line with the initial screening and comparative analysis completed for other Project components:

Initial Screening:

1. Identify Candidate Alternatives
2. Pre-screening Assessment
3. Alternative Characterization

Comparative Analysis:

4. Multiple Accounts Ledger
5. Value-Based Decision Process
6. Sensitivity Analysis

7. Document Results

Location alternatives for the Impoundment Facility and TMF are provided in detail in Appendix G.

The results of this assessment are summarized in Section 5.3.9.

5.2.2 The Influence of Consultation and Engagement on the Assessment

Canada Nickel has engaged with potentially affected Indigenous communities, regulators, the public, and other stakeholders. Table 15.1 provides a summary of the topics, key information including Indigenous knowledge, and concerns that Canada Nickel identified as part of their engagement efforts that relate to the assessment of alternatives.

Table 5.2 Summary of Key Information, Indigenous Knowledge, and Concerns for the Project Related to Alternatives Assessment

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement
Route or Corridor Options	<ul style="list-style-type: none"> • Apitipi Anicinapek Nation, Taykwa Tagamou Nation, Matachewan First Nation, Flying Post First Nation, Mattagami First Nation, and Métis Nation of Ontario - Region 3 recommend alternative corridors for the relocated Highway 655, rail spur, and relocated 500 kilovolt transmission line. • Apitipi Anicinapek Nation, Taykwa Tagamou Nation, Matachewan First Nation, Flying Post First Nation, Mattagami First Nation, and Métis Nation of Ontario - Region 3 expressed concern regarding potential effects to current and future use of lands and resources, including from construction of the rail line, transmission line, and highway relocation. These Project activities could affect access to harvesting, traplines and hunting camps, wildlife corridors, breeding grounds, and overwintering sites, the experience of being on the water, water quality and/or quantity, fish and fishing and harvesting and gathering of medicines, plants, and mushrooms. • Matachewan First Nation expressed concern regarding inhibited access to key Matachewan fishing areas due to the rerouting of Highway 655. • Mattagami First Nation expressed concern regarding the loss of ability to connect with important areas and spiritual values due to the relocation of Highway 655, increased road usage, and potential increases in wildlife mortality. • Mattagami First Nation expressed concern regarding barriers to accessing preferred harvesting locations due to Project-related gates, fencing, and the rerouting of Highway 655. 	<ul style="list-style-type: none"> • Corridor alternatives as well as potential effects on current and future use of lands and resources have been assessed in this Chapter. A comparative analysis of alternatives has been completed based on the potential for effects of the technically and economically feasible alternative means on each VC, including Indigenous Interests (see Table 5.1 for more details). 	<ul style="list-style-type: none"> • Chapter 5, Section 5.3.2.1 • Chapters 25-28 (Assessment of Potential Effects on Indigenous Interests)

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement
Water Diversion Routes	<ul style="list-style-type: none"> Flying Post First Nation, Matachewan First Nation, and Mattagami First Nation expressed concern regarding the dewatering and diversion of any waterbodies since protection of water is a sacred First Nation responsibility. Matachewan First Nation expressed concern regarding the disruption of the natural flow of waterways and waterbodies, including the Mattagami River, impacting aquatic and terrestrial species due to landscape alteration and excavation from open pit mining. Matachewan First Nation recommends modifying Project operations and infrastructure to reduce or eliminate impacts to water. 	<ul style="list-style-type: none"> Concerns about water diversion have been considered in this Chapter for each of the alternatives that were considered. Alternatives have been considered to reduce the Project footprint so that, in general, the smallest footprint would be preferred where practical. 	<ul style="list-style-type: none"> Chapter 5, Section 5.3.7 Chapters 25-28 (Assessment of Potential Effects on Indigenous Interests)
Wildlife Habitat Diversion Routes	<ul style="list-style-type: none"> Matachewan First Nation recommends modifying Project operations and infrastructure to reduce or eliminate impacts to wildlife. Matachewan First Nation, Flying Post First Nations, and Mattagami First Nation recommend construction of wildlife fences, overpasses and corridors during realignment of Highway 655 to promote protections of moose and other wildlife and the consideration of historical wildlife corridors. 	<ul style="list-style-type: none"> Concerns about effects on wildlife have been considered in this Chapter for each of the alternatives that were considered. Alternatives have been considered to reduce the Project footprint so that, in general, the smallest footprint would be preferred where practical. 	<ul style="list-style-type: none"> Chapter 5, Section 5.3 Chapters 25-28 (Assessment of Potential Effects on Indigenous Interests)

Topic	Key Information, Indigenous Knowledge, and Concerns	Influence on the Assessment	Where Information is Addressed in the Impact Statement
Project Design	<ul style="list-style-type: none"> • Métis Nation of Ontario - Region 3 recommended redesigning the PA to eliminate or reduce the amount of legal restrictions placed on lands that effect Métis Nation of Ontario - Region 3 citizens from exercising their rights or offset effects by converting an equal or greater amount of currently occupied lands to unoccupied within a contextually equivalent and geographically similar area. • Métis Nation of Ontario - Region 3 recommended redesigning Project components to eliminate or reduce all activities, conditions or features that are not preferred or are avoided by Métis Nation of Ontario - Region 3 such as increased vehicle traffic, noise, dust, odours, and industrial workers. • Apitipi Anicinapek Nation Taykwa Tagamou Nation, Flying Post First Nation, and Métis Nation of Ontario - Region 3 recommended alternative means to reduce habitat loss and overprinting of tributaries of the North Driftwood and West Buskegau Rivers. • Matachewan First Nation, Mattagami First Nation, and Flying Post First Nation recommend consultation on the location of any new access roads that could lead to increased access by non-members to areas used for harvesting by members. • Comments were received from the public during the Public Information Centre (PIC) in 2024, regarding the location of mine infrastructure and processing facilities. Comments related to reducing loss of fish habitat during the design, and location of a second processing plant. 	<ul style="list-style-type: none"> • Concerns have been addressed in this Chapter. Alternatives have been considered to reduce the Project footprint so that, in general, the smallest footprint would be preferred where practical. • Table 5.1 provides the VCs and indicators used for the assessment of alternatives. 	<ul style="list-style-type: none"> • Chapter 5, Section 5.3 • Chapters 25-28 (Assessment of Potential Effects on Indigenous Interests)
Mine Waste Management	<ul style="list-style-type: none"> • Apitipi Anicinapek Nation, Taykwa Tagamou Nation, Matachewan First Nation, Flying Post First Nation, Mattagami First Nation, and Métis Nation of Ontario - Region 3 recommended alternative means and mitigation for waste rock, effluent discharge, including site selection, tailings management, and ore processing location. • Apitipi Anicinapek Nation, Taykwa Tagamou Nation, Matachewan First Nation, Flying Post First Nation, Mattagami First Nation, and Métis Nation of Ontario - Region 3 recommended potential re-use of excavated waste rock to improve nearby ATV trails. 	<ul style="list-style-type: none"> • A comparative analysis of alternatives has been completed based on the potential for effects of the technically and economically feasible alternative means on each VC (see Table 5.1 for more details). 	<ul style="list-style-type: none"> • Chapter 5, Section 5.3.8 • Chapter 5, Section 5.3.9 • Chapter 5, Section 5.3.10.3 • Chapters 25-28 (Assessment of Potential Effects on Indigenous Interests)

Where made available by Indigenous nations through engagement, information gathering, and voluntary information sharing, Indigenous knowledge has been considered and incorporated into the Impact Statement, as applicable. Refer to Chapter 7 (Description of Engagement with Indigenous Peoples) for detailed methods regarding the incorporation of Indigenous knowledge to the Impact Statement.

5.2.3 Long List of Alternative Means

Based on the approach described in Section 5.2 and in consideration of the key Project elements from Section 4.4 of the TIS Guidelines, the initial list of candidate ‘alternative means’ of carrying out the Project is provided in Table 5.3.

Table 5.3 Long List of Candidate Alternative Means

TIS Guidelines List of Key Project Elements	Project Component	List of Candidate Alternatives Identified for the Initial Screening
Project layout, Component Size and Locations	Various	<ul style="list-style-type: none"> Discussed in each Project component, where appropriate
Route or Corridor Options	Highway 655/500 kV transmission line/rail line	<ul style="list-style-type: none"> C1: West of existing corridor (west of Open Pit and west of Gerry Lake) C2: East of existing corridor (east of Open Pit and west of West Buskegau River) C3: West of C1 (further west of Gerry Lake and closer to Mattagami River) C4: Existing corridor ('Do Nothing')
	Transportation of concentrate from site	<ul style="list-style-type: none"> Concentrate by rail Concentrate by truck
	Transportation of freight to site	<ul style="list-style-type: none"> Deliveries by rail Deliveries by truck
	Site access	<ul style="list-style-type: none"> SA1: Construction of new access road to Process Plant Area SA2: Upgrades to the existing secondary road west of lake complex SA3: Use of abandoned remnant of Highway 655 and then run west of TMF
Energy and Power Sources		<ul style="list-style-type: none"> Renewable energy (on-site solar or wind) Diesel or fuel generation Connection to the grid (transmission line) Natural gas power plant Small Modular Reactor (SMR)
Water Supply Sources	Potable water supply	<ul style="list-style-type: none"> Groundwater source (within the PA) Surface water source (adjacent to the PA)
	Process plant water supply	<ul style="list-style-type: none"> Closed loop Open loop Combined

TIS Guidelines List of Key Project Elements	Project Component	List of Candidate Alternatives Identified for the Initial Screening
Aggregate Supply Sources		<ul style="list-style-type: none"> • A1: Use mined waste rock and aggregate from within the PA • A2: Use third-party quarries and/or pits outside of the PA
Water Crossing Structures and Locations		<ul style="list-style-type: none"> • Combination of culverts, bridges, and other engineered solutions designed to reduce effects while maintaining hydrological connectivity
Water Diversion Alternatives	Water Diversion Methods	<ul style="list-style-type: none"> • Diversion • Pumping • Do Nothing
	North Driftwood River Diversion Routes	<ul style="list-style-type: none"> • ND1 - Diversion channel in existing watercourse valley • ND2 - Diversion channel in new perimeter valley (west side of the realigned corridor) • ND3 - Diversion channel out of Gerry Lake (Detailed Project Description [Canada Nickel 2022] alternative) • ND4 - Diversion channel in new perimeter valley (east side of the realigned corridor)
Mining-related Activities	Mining operations	<ul style="list-style-type: none"> • Open Pit • Block cave (underground)
	Ore Process Plant location	<ul style="list-style-type: none"> • East of relocated Highway 655 • West of relocated Highway 655
	Ore Process Plant design	<ul style="list-style-type: none"> • Ore processing methods are controlled by laboratory testing and analyses to obtain optimal recovery utilizing full scale proven technologies
Mine Waste Management	Impoundment Facility	<ul style="list-style-type: none"> • MWM-1 – This alternative refers to the Impoundment Facility located north of the Open Pit. • MWM-2 – This alternative consists of the storage area located south of the Open Pit and a fraction of storage facility north of the Open Pit. • MWM-3 – This alternative consists of the storage area located west of realigned Highway 655 and the same area north of the Open Pit as described in MWM-2. • MWM-4 – This alternative refers to an area to the east of West Buskegau river.
	Tailings Management Facility	<ul style="list-style-type: none"> • South of Open Pit with In-Pit Disposal • North of Open pit with In-Pit Disposal • South of Open Pit (All Above Ground Disposal) • North of Open Pit (All Above Ground Disposal) • North and South of Open Pit (All Above Ground Disposal) • East of the West Buskegau River with In-Pit Disposal
	Tailings management techniques to improve carbon sequestration	<ul style="list-style-type: none"> • Passive mineral carbonation • Active mineral carbonation (IPT carbonation)

TIS Guidelines List of Key Project Elements	Project Component	List of Candidate Alternatives Identified for the Initial Screening
Water and Wastewater Management	Domestic sewage waste	<ul style="list-style-type: none"> • On-site sewage treatment plant • On-site septic systems • Sewage lagoons
	Water treatment technology	<ul style="list-style-type: none"> • Water treatment plant • Collection ponds • No treatment
	Effluent Discharge Locations -operation	<ul style="list-style-type: none"> • Single discharge location: Mattagami River and other locations (Detailed Project Description [Canada Nickel 2022] alternative) • Distributed (multiple) discharge locations to the North Driftwood River and West Buskegau River
Waste Management	Domestic and industrial waste	<ul style="list-style-type: none"> • Disposal within an existing licensed facility • Disposal within a new licensed facility
	Hazardous waste	<ul style="list-style-type: none"> • Transportation to a licensed facility off-site
Suspension, Decommissioning, or Abandonment Options	Decommissioning and Closure	<ul style="list-style-type: none"> • Closure rehabilitation (upon completion of operations) • Progressive rehabilitation
Workforce Hiring, Scheduling and Accommodation Strategies	Workforce hiring	<ul style="list-style-type: none"> • Various hiring strategies to be used
	Scheduling	<ul style="list-style-type: none"> • Three x 8-hour shifts • Two x 12-hour shifts
	Accommodation strategies	<ul style="list-style-type: none"> • No Project accommodation • Off-site accommodation • On-site accommodation

The list of candidate alternatives presented in Table 5.3 was then screened for their technical and economic feasibility based on the criteria presented in Section 5.2.1.1, resulting in a shorter list of alternatives. In cases where only a single reasonable alternative mean was screened in for a Project component, a summary of the rationale for this decision is provided in the subsequent sections.

5.3 Alternative Means of Carrying Out the Project

The following sections provide a summary of the ‘alternative means’ considered for each corresponding Project component and identifies the selection and rationale for the preferred alternative incorporated into the Project design, based on the approach described above and structured around the elements listed in Section 4.4 of the TIS Guidelines.

The Project components considered in the evaluation of alternative means were selected based on the TIS Guidelines and whether (1) technically or economically feasible alternatives exist and (2) alternative locations and/or designs of each component could result in materially different environmental effects.

5.3.1 Project Layout, Component Size, and Locations

The first key element listed in Section 4.4 of the TIS Guidelines (i.e., Project layout, component size and locations), is not a specific element on its own, but rather an overall consideration during the alternatives assessment. In fact, the Project site layout has been developed by Canada Nickel to take into consideration the following key constraints:

- Location of the ore body and corresponding Open Pit
- Ore and rock stockpiles located immediately adjacent to Open Pit
- Run-of-mine pad, primary crushing and fuel farm located next to south exit from Open Pit
- Process Plant located near the relocated highway, powerline, and rail corridor for personnel and power access and ease of product transportation

The ultimate Project layout reflects the results of the Feasibility Study to design an efficient and cost-effective mining operation that reduces potential environmental effects to the extent possible. Rather than evaluating alternative Project layouts comprehensively, an evaluation of alternative Project components and locations is provided, acknowledging the interconnectedness of how these components interact within the larger Project layout.

5.3.2 Route or Corridor Options

5.3.2.1 Highway 655 / 500kV Transmission Line / Rail Line Corridor

Step 1 - Initial Screening

As the ore deposit is partially located under the existing Highway 655/500 kV transmission line corridor, realignment of an approximately 26 kilometre (km) segment of the highway and transmission line is required to accommodate the Open Pit and other Project components, since mine operation would not be feasible without relocating the corridor. Only a single corridor was considered given that using the same physical space (smaller footprint than separate alignments) would be more efficient and result in:

- reduced potential for environmental effects
- reduced need for materials needed during construction of the realignment
- reduced visual clutter by avoiding multiple parallel lines of infrastructure

'Alternative means' for the realignment of this corridor were identified that will bypass the PA. Additionally, a new rail line will be constructed to facilitate the transport of materials to and from the mine. This new rail line will ultimately be owned by Ontario Northland Railway (ONR), a Crown agency reporting to the Ministry of Transportation (MTO), and it is also included as part of the relocated corridor. The alignment of the rail corridor is dependent upon the alignment of the highway and transmission line corridor, for the reasons mentioned above.

The potential routes were determined after the location and extent of the Open Pit was confirmed (as the mineral resource cannot be moved, and therefore forms the basis for siting considerations for all other

Project components) as well as after the locations of the processing and ore stockpile facility were confirmed (as these need to be located in close proximity to the Open Pit, for operational viability and to limit the potential for environmental effects). In all cases, connection between the corridor infrastructure and the mine site (i.e., transmission connection, highway access, and rail connection to the Ore Processing Plant) would require infrastructure within the PA, the location of which is dependent upon the alignment selected and the effects of which would be considered in the assessment of effects for the Project.

The corridor realignment alternatives focused on alternative corridors, with routing of the specific Project components to be refined through the Class EA and/or detailed design processes. For example, final Highway 655 design will be required to meet MTO design standards, and the final 500 kV transmission line will be required to meet Hydro One's design standards, regardless of the final location. Similarly, design standards for the proposed rail spur will match the design standards for the existing ONR spur line.

Four candidate alternative alignments were considered:

- C1 - West of existing corridor (west of Open Pit and west of Gerry Lake): In this alternative, the alignment of Highway 655 would deviate west from its existing alignment beginning approximately at the northwest corner of the Impoundment Facility and connecting back into the existing Highway 655 approximately 5 km north of Kidd Creek Mine Road. Approximately 26 km of Highway 655 would be realigned to divert Highway 655 traffic around the mine site. Once realigned, the existing section of Highway 655 that would be overprinted by mine infrastructure would be decommissioned. The transmission line would follow a similar corridor and be located along the west side of Highway 655, while the new rail spur serving the Project would be located along the east side of the corridor from a location near the Process Plant to the existing ONR spur line serving the Kidd Mine just east of Highway 655.
- C2 - East of existing corridor (east of Open Pit and west of West Buskegau River): In this alternative, the alignment of Highway 655 would deviate east from its existing alignment beginning approximately 4 km north of the Impoundment Facility and connecting back into the existing Highway 655 approximately 8 km north of Kidd Creek Mine Road. The transmission line and rail spur would follow a similar corridor, with the new rail spur connecting to the Process Plant from the west side of the corridor.
- C3 – West of C1 alternative (further west of Gerry Lake and closer to Mattagami River): In this alternative, the alignment of Highway 655 would deviate further west compared to alternative C1 from its existing alignment, connecting back into the existing Highway 655 approximately 8 km north of Kidd Creek Mine Road. The transmission line and rail spur would follow a similar corridor, with the new rail spur connecting to the Process Plant from the east side of the corridor.
- C4 – Existing corridor ('Do Nothing'): In this alternative, no realignment would be completed for the Highway 655 and the 500 kV transmission line. The construction of a temporary haul road crossing would be required to permit the transport of ore across the existing Highway 655 corridor.

All four alternatives meet the MTO's minimum design requirements for the highway and are compatible with the local site constraints. Figure 5.2 presents the alternatives that were considered in the comparative analysis.

Alternative C1, C2 and C3 were identified in the Detailed Project Description (Canada Nickel 2022). Alternative C4, considered the 'Do Nothing' (no realignment) alternative in this case, is identified to serve as a benchmark against which the other alternatives are compared (as required under the Class EAs for the highway realignment and transmission line relocation).

Alternatives C1 and C2 were considered technically and economically feasible based on financial costs (i.e., costs are not prohibitive for Project implementation), constructability (i.e., no unnecessary design constraints identified that would limit constructability), proven technology (i.e., alternatives to follow applicable design standards) and safety (i.e., alternatives can be safely constructed and operated). While alternative C4 is not considered economically feasible over the life of the Project, it is a technically feasible alternative, although implementing this alternative would render a substantial portion of the existing mineral reserve inaccessible for extraction (since Highway 655 bisects the location of the proposed Open Pit) and therefore poses substantive adverse economic impacts to the Project.

Alternative C3 is similarly considered technically and economically feasible, however, this alternative was originally included in the Detailed Project Description (Canada Nickel 2022) as an option to avoid originally planned infrastructure west of Highway 655 that has since been revised and removed from the Project. As such, the rationale for C3 to be considered as a feasible alternative no longer exists and C1 provides an opportunity to assess an alternative corridor west of the Project.

Of note, alternative C4 (including the temporary haul road crossing to facilitate the movement of mine equipment and conveyor from the ore processing area to the processing plant) would be implemented at the beginning of construction until such time as a relocated corridor is constructed and operational. Further, while not economically feasible as a long-term viable solution for the Project, alternative C4 was carried forward to the comparative analysis to comply with the requirements of the Class EAs for the highway realignment and transmission line relocation.

Step 2 - Examination of Potential Effects on Valued Components

Highways result in direct disturbance to existing features during construction, and operational impacts related to water quality impacts from runoff, traffic noise, wildlife interactions, and air emissions from vehicle exhaust.

Transmission lines may result in effects to vegetation, wetland, and riparian communities as a result of tree and vegetation clearing during construction, as well as maintenance of cleared areas during operation that is required for safety. Transmission lines also have operational impacts on bird mortality as a result of collisions.

The construction of railway spur lines result in the loss of vegetation, wetland, and riparian communities, and associated wildlife habitat, within and the right-of-way. These alterations can disrupt local ecosystems, affect wildlife, and alter drainage patterns.

Combining infrastructure into a common corridor, reducing the length of these corridors, routing corridors to avoid sensitive features, such as watercourses and specialized habitat features, are important factors to consider in order to reduce potential effects and overall costs to the Project.

Step 3 - Comparative Analysis

Table 5.4 provides the comparative analysis between the 'alternative means' that were considered feasible.

Table 5.4 Corridor Comparative Analysis

VC/Criteria	Indicator	C1 – West of Existing Corridor	C2 – East of Existing Corridor	C4 – Existing Corridor ('Do Nothing')
Natural Environment				
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral - this alternative represents approximately 25.1 km of new road, thus having greater potential for effects on terrain stability as compared with alternative C4. Once realigned and in place, negligible effects on terrain stability are expected. Effects can be managed through MTO design requirements and applicable standards.	Neutral - this alternative represents approximately 27.9 km of new road, thus having greater potential for effects on terrain stability as compared with alternative C4. Once realigned and in place, negligible effects on terrain stability. Effects can be managed through MTO design requirements and applicable standards.	Neutral – alternative does not include realignment of corridor but includes the construction of a temporary bypass to route highway traffic around the construction zone resulting in the lowest effects on terrain stability in comparison with the other alternatives. However, the existing corridor would bisect the Open Pit, potentially resulting in effects on terrain stability. Effects can be managed through MTO design requirements and applicable standards.
Soil	<ul style="list-style-type: none"> Change in soil quality and quantity 	Disadvantage - this alternative represents approximately 25.1 km of new road, thus having greater potential for effects on soil quality and quantity as compared with alternative C4. Once realigned and in place, negligible effects on soil quality and quantity are expected from traffic and equipment. Effects can be managed through MTO design requirements and applicable standards.	Disadvantage - this alternative represents approximately 27.9 km of new road, thus having greater potential for effects on soil quality and quantity as compared with alternative C4. Once realigned and in place, negligible effects on soil quality and quantity are expected from traffic and equipment. Effects can be managed through MTO design requirements and applicable standards.	Advantage – alternative does not include realignment of corridor but includes the construction of a temporary bypass to route highway traffic around the construction zone resulting in the lowest effects on soil quality and quantity in comparison with the other alternatives. Effects can be managed through MTO design requirements and applicable standards.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Disadvantage – construction equipment and vehicle traffic will generate emissions that affect air quality. However, this alternative is 2.7 km shorter than C2; therefore, fewer emissions expected relative to alternative C2 but more than C3. This alternative results in an overall section of Highway 655 that is shorter than C2 but longer than C3.	Disadvantage – construction equipment and vehicle traffic will generate emissions that affect air quality. This alternative would result in the longest highway and is 2.7 km longer than C1, thereby resulting in greater emissions than either alternative C1 or C3. This alternative results in the longest overall section of Highway 655.	Advantage – construction equipment and vehicle traffic will generate emissions that affect air quality, although generally consistent with existing conditions as there is no highway realignment, and therefore less than alternative C1 or C2. This alternative results in the shortest overall section of highway.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient light 	Neutral – negligible change in emissions from traffic and equipment that affect ambient light. Effects can be managed through MTO design requirements and applicable standards.	Neutral - negligible change in emissions from traffic and equipment that affect ambient light. Effects can be managed through MTO design requirements and applicable standards.	Neutral - negligible change in emissions from traffic and equipment that affect ambient light. Effects can be managed through MTO design requirements and applicable standards.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral – temporary impacts during construction, although minimal change in noise during operation. Relocation to new corridor results in noise and vibration emissions from traffic and equipment occurring in new areas relative to existing alignment. Alignment closer to some existing receptors (3 receptors within 2 km of the PA) but further from others (10 receptors beyond 2 km).	Neutral – temporary impacts during construction, although minimal change in noise during operation. Relocation to new corridor results in noise and vibration emissions from traffic and equipment occurring in new areas relative to existing alignment. Alignment closer to some existing receptors (4 receptors within 2 km of the PA) but further from others (9 receptors beyond 2 km).	Neutral – negligible change in noise and vibration emissions from traffic and equipment. Effects can be managed through MTO design requirements and applicable standards.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Neutral – negligible effect on groundwater quality and quantity associated with realignment. Effects can be managed through design and standard mitigation.	Neutral – negligible effect on groundwater quality and quantity associated with realignment. Effects can be managed through design and standard mitigation.	Neutral – negligible effect on groundwater quality and quantity associated with overpass and temporary bypass. Effects can be managed through design and standard mitigation.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Disadvantage – construction of this alternative would directly affect North Driftwood River and several tributaries, requiring additional diversion, culverts and/or bridges that may alter water flows and affect quality. Effects can be managed through design and standard mitigation Alternative may require 25 watercourse crossings.	Disadvantage – construction of this alternative would directly affect West Buskegau River and several tributaries, requiring additional diversion, culverts and/or bridges that may alter water flows and affect quality. Effects can be managed through design and standard mitigation Alternative may require 25 watercourse crossings.	Advantage – reduced effects on surface water quality and quantity associated with the temporary bypass. Effects can be managed through design and standard mitigation. Temporary bypass may require 2 watercourse crossings.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Disadvantage – construction of this alternative would directly affect vegetation communities, including SOCC, rare vegetation, woodlands and wetlands, as clearing along route would be required. Approximately 361 ha of woodland and wetland may be removed during construction.	Disadvantage – construction of this alternative would directly affect vegetation communities, SOCC, rare vegetation, including woodlands and wetlands, as clearing along route would be required. Approximately 230 ha of woodland and wetland may be removed during construction	Advantage - construction of this alternative would directly affect vegetation communities, including SOCC, rare vegetation, woodlands and wetlands. However, the overall footprint of the temporary bypass is substantially smaller than alternatives C1 and C2 and so effects are anticipated to be lower. No change to vegetation communities along existing transmission line.

VC/Criteria	Indicator	C1 – West of Existing Corridor	C2 – East of Existing Corridor	C4 – Existing Corridor ('Do Nothing')
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	<p>Disadvantage – construction of this alternative would directly affect North Driftwood River and several tributaries, requiring additional flow diversion and may affect fish habitat.</p> <p>Alternative may require 25 watercourse crossings, including North Driftwood River and its tributaries.</p>	<p>Disadvantage – construction of this alternative would directly affect the West Buskegau River and several tributaries, requiring additional flow diversion and may affect fish habitat.</p> <p>Alternative may require 25 watercourse crossings, including West Buskegau River and its tributaries.</p>	<p>Advantage – alternative does not include realignment of corridor resulting in the lowest effects on fish and fish habitat in comparison with the other alternatives.</p> <p>Temporary bypass may require 2 watercourse crossings but avoids North Driftwood and West Buskegau rivers.</p>
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	<p>Disadvantage – construction of this alternative may result in direct and/or indirect loss or alteration of bird habitat and has the potential to affect abundance and increase risk of mortality.</p> <p>Approximately 455 ha of bird habitat may be removed during construction.</p>	<p>Disadvantage – construction of this alternative may result in direct and/or indirect loss or alteration of bird habitat and has the potential to affect abundance and increase risk of mortality.</p> <p>Approximately 283 ha of bird habitat may be removed during construction.</p>	<p>Advantage – construction of the temporary bypass may result in direct and/or indirect loss or alteration of bird habitat, but given small footprint is not expected to affect abundance or increase the risk of mortality.</p> <p>However, the overall footprint of this alternative is substantially smaller than alternatives C1 and C2 and so effects are anticipated to be lower. No change to habitat along existing transmission line is expected.</p>
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	<p>Disadvantage – realignment route alternative may result in direct and/or indirect loss or alteration of habitat and has the potential to affect wildlife movement and increase risk of wildlife mortality. Alters location of existing activities to new area, bisecting the North Driftwood.</p> <p>Approximately 622 ha of wildlife habitat may be removed during construction.</p>	<p>Disadvantage – realignment route alternative may result in direct and/or indirect loss or alteration of habitat and has the potential to affect wildlife movement and increase risk of wildlife mortality. Alters location of existing activities to new area, bisecting the West Buskegau River.</p> <p>Approximately 652 ha of wildlife habitat may be removed during construction.</p>	<p>Advantage – results in the loss of wildlife habitat during construction of the temporary bypass. However, the overall footprint of this alternative is substantially smaller than alternatives C1 and C2. No change to vegetation communities along existing transmission line. Existing route may result in direct and/or indirect loss or alteration of habitat and has the potential to affect wildlife movement and increase risk of wildlife mortality, however, to a lesser degree in comparison with alternatives C1 and C2.</p>
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	<p>Disadvantage – construction equipment and vehicle traffic will generate GHG emissions.</p> <p>This alternative is 2.7 km shorter than C2; therefore, less emissions expected during operations relative to alternative C2.</p>	<p>Disadvantage – construction equipment and vehicle traffic will generate GHG emissions.</p> <p>This alternative would result in the longest highway and is 2.7 km longer than C1, thereby resulting in greater emissions during operations than either of the alternatives.</p>	<p>Advantage – GHG emissions would be generally consistent with existing conditions as there is no highway realignment; negligible increase in highway length as a result of the construction of a temporary bypass to route highway traffic around the construction zone.</p>
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	<p>Neutral – negligible effects on health conditions as a result of the realignment since potential effects can be mitigated through siting, design and standard mitigation.</p>	<p>Neutral – negligible effects on health conditions as a result of the realignment since potential effects can be mitigated through siting, design and standard mitigation.</p>	<p>Neutral – negligible effects on health conditions as a result of this alternative since potential effects can be managed through design and standard mitigation.</p>
Social and Economic Conditions				
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	<p>Disadvantage – limited effects on services and infrastructure as a result of the realignment since potential effects can be mitigated through siting, design and standard mitigation.</p> <p>This alternative is 2.7 km shorter than C2; therefore, somewhat decreasing travel times along the highway relative to alternative C2.</p>	<p>Disadvantage – limited effects on services and infrastructure as a result of the realignment since potential effects can be mitigated through siting, design and standard mitigation.</p> <p>This alternative would result in the longest highway and is 2.7 km longer than C1, thereby somewhat increasing travel times along the highway than either of the alternatives.</p>	<p>Advantage – limited effects on services and infrastructure as a result of this alternative since potential effects can be managed through design and standard mitigation.</p> <p>This alignment does not result in a change in travel times relative to existing conditions.</p>
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	<p>Neutral – effects on recreation, navigation or land and resource uses may be more difficult to manage due to ground disturbance.</p> <p>This alternative requires no new crossings of the existing snowmobile trail.</p>	<p>Neutral – effects on recreation, navigation or land and resource uses may be more difficult to manage due to ground disturbance.</p> <p>This alternative requires 2 new crossings of the existing snowmobile trail, although resulting affects are expected to be negligible through appropriate mitigation (i.e., signage)</p>	<p>Neutral – effects on recreation, navigation or land and resource uses may be more difficult to manage due to ground disturbance.</p> <p>This alternative requires no new crossings of the existing snowmobile trail.</p>
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	<p>Disadvantage – realignment route alternative has potential to permanently remove, disrupt, or displace archaeological resources (i.e., approximately 26.2 ha archaeological potential).</p>	<p>Disadvantage – realignment route alternative has potential to permanently remove, disrupt, or displace archaeological resources (i.e., approximately 10.9 ha archaeological potential).</p>	<p>Advantage – alternative may affect archaeological resources. However, the overall footprint of this alternative is substantially smaller than alternatives C1 and C2.</p>

VC/Criteria	Indicator	C1 – West of Existing Corridor	C2 – East of Existing Corridor	C4 – Existing Corridor ('Do Nothing')
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Neutral – negligible effect on economic conditions as a result of the realignment.	Neutral – negligible effect on economic conditions as a result of the realignment.	Neutral – negligible effect on economic conditions as a result of the alternative.
Indigenous Peoples				
Indigenous Interests	<ul style="list-style-type: none"> Change to Indigenous and treaty rights (includes Indigenous land and resources use) Change in physical and cultural heritage Change to governance, health, social and economic conditions of Indigenous nations 	<p>Disadvantage – construction of this alternative may result in direct and/or indirect loss or alteration of fish, bird and wildlife habitat and has the potential to affect abundance of traditionally harvested species. Construction of the road will generate noise, dust and air emissions and may render some current use areas less suitable.</p> <p>Potential effects on Indigenous land and resource use as well as potential effects on heritage are considered similar to alternative C2.</p>	<p>Disadvantage – construction of this alternative may result in direct and/or indirect loss or alteration of fish, bird and wildlife habitat and has the potential to affect abundance of traditionally harvested species. Construction of the road will generate noise, dust and air emissions and may render some current use areas less suitable.</p> <p>Potential effects on Indigenous land and resource use as well as potential effects on heritage are considered similar to alternative C1.</p>	Advantage – potential effects on Indigenous land and resource use and heritage resources are considered lower than alternatives where a realignment would introduce disturbance to new areas.
Technical / Economic				
Financial Costs	Alternative does not result in prohibitively high capital costs and operating costs	Advantage – construction and operational cost is less expensive than alternative C2, but more expensive than alternative C4, due to length of the highway / transmission lines and number of highway watercourse crossings / diversions anticipated	Disadvantage – construction and operational costs are highest relative to both alternatives due to overall length of the highway/transmission lines and number of highway watercourse crossings/diversions anticipated	Major Disadvantage – construction cost is the least expensive of the alternatives considered; however, since this alternative renders a portion of the pit (resource) inaccessible, implementing this alternative is not economically feasible for the Project (lost opportunity associated with the ore deposit).
Constructability	Alternative is constructable while avoiding undue or unnecessary design constraints.	Advantage – alternative can be constructed using conventional construction methods.	Disadvantage – alternative can be constructed using conventional construction methods. Additional consideration warranted to accommodate existing 115 kV transmission line that runs along east side of the Project.	Advantage – alternative can be constructed using conventional construction methods. Overpass required to facilitate mine movements (vehicles, ore) beneath Highway 655.
Proven Technology	Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.
Safety	Alternative can be safely constructed and operated	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		<p>PREFERRED –</p> <p>This alternative has advantages in terms of potentially lower effects relative to Alternative C2 on air quality, soils, surface water, fish, bird and wildlife habitat, and climate change as it results in a shorter route than Alternative C2 and correspondingly less footprint impact, travel distance, and associated costs. This alternative also facilitates access to the entirety of the Open Pit, and therefore provides substantial financial benefit over C3.</p>	<p>NOT PREFERRED –</p> <p>This alternative has disadvantages in terms of potential effects on air quality, soils, surface water, fish, bird and wildlife habitat, and climate change as it results in the longest route and correspondingly greater footprint impact, travel distance, and associated costs. This alternative also facilitates access to the entirety of the Open Pit, and therefore provides substantial financial benefit over C3.</p>	<p>NOT PREFERRED –</p> <p>While this alternative would avoid environmental effects associated with a realignment, this alternative is not economically feasible over the life of the Project since its implementation would render a substantial portion of the existing mineral reserve inaccessible for extraction. This alternative is feasible as an interim solution until the preferred corridor alignment is complete.</p>

Based on the results of the alternatives assessment, alternative C1 was selected as the preferred alternative because this alternative is shorter with fewer requirements to manage water flow relative to alternative C2, which provides advantages in terms of reduced relative effects on air quality and GHG emissions, surface water, and fish and fish habitat (i.e., shorter alignment). This alternative also results in a smaller footprint than alternative C2, which reduces the magnitude of potential direct and indirect effects on vegetation communities (wetlands, woodlands), birds and bird habitats, and wildlife and wildlife habitat.

While all alternatives can be constructed using conventional construction methods, additional consideration during design and construction would be required for alternatives C2 and C4 to accommodate existing infrastructure. Alternative C2 would necessitate crossing beneath the existing 115 kV transmission line that runs along the east side of the Project, which may require alterations to the geometry/location of that transmission line. Alternative C4 would necessitate the construction of an overpass or underpass to facilitate mine movements (i.e., vehicles, ore) crossing the existing Highway 655.

While alternative C4 would eliminate the need to relocate the highway and transmission lines, thereby reducing the overall footprint of the Project, the option of leaving the highway and transmission line in their current location for the duration of the Project is not economically feasible as extraction of the resource would be limited. Relocating the highway, as provided for in alternative C1 and C2, allows for the full extent of the Open Pit to be developed (including the portion that exists beneath the existing highway and transmission line corridors). Alternative C4 (specifically the construction of the temporary bypass and Highway 655 overpass or underpass) is proposed for a short period of time at the beginning of the Project to facilitate Project initiation while the ultimate alignment of the highway and transmission line can be constructed.

Alternative C2 was not chosen as the preferred alignment because it would directly affect a substantive portion of the West Buskegau River and its tributaries, with greater relative effects on terrestrial and aquatic habitats relative to alternative C1 due to its increased overall highway length, footprint impacts, and overprinting of riparian areas during construction. Accommodating the realigned highway and transmission lines adjacent to the existing 115 kV transmission line along the east side of the Project would provide the opportunity to consolidate these transmission lines within a single, wider corridor (albeit only for the distance immediately adjacent to the Project).

5.3.2.2 Transportation of Concentrate from Site

Step 1 - Initial Screening

Transportation of concentrate from the site is a critical aspect that requires careful consideration due to its potential consequences on economic feasibility of the Project as well as potential environmental effects.

Two candidate alternatives were considered:

- Concentrate by rail – delivery of concentrate from the Processing Plant via rail using existing rail networks
- Concentrate by truck – delivery of concentrate from the Processing Plant via truck using existing provincial highways

Transportation of concentrate from the site by rail requires a new rail spur to facilitate the transport of materials to and from the mine, which would be part of the realigned corridor and is addressed in Section 5.3.2.1. Both candidate alternatives were considered technically and economically feasible based on financial costs (i.e., costs are not prohibitive for Project implementation), constructability (i.e., no unnecessary design constraints identified), proven technology (i.e., truck and rail transportation have been used for this purpose) and safety (i.e., alternatives can be safely constructed and operated). Therefore, both alternatives were carried forward to the comparative analysis step.

Step 2 - Examination of Potential Effects on Valued Components

Transportation is a major consumer of energy, and most of it comes from burning petroleum-based fuels (i.e., diesel). Trucks produce GHG (i.e., CO₂) and other emissions that affect air quality while moving smaller volumes of concentrate (i.e., single trailer), while locomotives produce greater volumes of air emissions (similar constituents) but are able to move larger volumes of material (i.e., multiple cars) in a single trip.

Both trucks and trains generate noise during operation, pose a risk to wildlife as a result of collisions, and accidents involving trucks or trains can have environmental consequences such as contamination of soil and water due to potential spills.

Step 3 - Comparative Analysis

Table 5.5 provides the comparative analysis between the two alternative means that were considered feasible.

Table 5.5 Transportation of Concentrate from Site Comparative Analysis

VC/Criteria	Indicator	Concentrate by Rail	Concentrate by Truck
Natural Environment			
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral – no interaction between transportation of concentrate from site and terrain stability.	Neutral – no interaction between transportation of concentrate from site and terrain stability.
Soil	<ul style="list-style-type: none"> Change in soil quality and quantity 	Neutral – no interaction between transportation of concentrate from site and soil quality and quantity.	Neutral – no interaction between transportation of concentrate from site and soil quality and quantity.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Advantage – reduced emissions relative to transportation by truck. Transportation by rail is considered more efficient given volumes of material to be transported daily.	Disadvantage – greater emissions relative to rail transportation given number of daily truck trips required to transport the same volume of concentrate.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral – negligible light emissions from rail transportation (locomotive headlight travelling along new spur/existing rail line).	Neutral – negligible light emissions from truck transportation (truck headlights travelling along existing highway).
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral – increased magnitude with reduced frequency of noise and vibration emissions from rail traffic along existing network (i.e., partial use of existing rail line reduces change to existing conditions) relative to additional truck traffic.	Neutral – increased frequency with reduced magnitude of noise and vibration emissions from truck traffic along existing network relative to additional train traffic.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Neutral – negligible effect on groundwater quantity and quality under normal operating conditions (likelihood of spill considered low).	Neutral – negligible effect on groundwater quantity and quality under normal operating conditions (likelihood of spill considered low).
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Neutral – negligible effects on surface water quality and quantity associated transport of concentrate from site under normal operating conditions (likelihood of spill considered low). Effects can be managed through design and standard mitigation.	Neutral – negligible effects on surface water quality and quantity associated transport of concentrate from site under normal operating conditions (likelihood of spill considered low). Effects can be managed through design and standard mitigation.

VC/Criteria	Indicator	Concentrate by Rail	Concentrate by Truck
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Disadvantage – transportation by rail requires construction of new spur line, resulting in effects on vegetation during construction; rail transportation would result in deposition of dust on adjacent vegetation while transporting concentrate from site along rail network.	Advantage – transportation by truck facilitated through use of existing roadways, so no effects on vegetation during construction; truck transportation would result in deposition of dust on adjacent vegetation while transporting concentrate from site along road network, although incremental impact less than for rail transportation.
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Neutral – negligible effects on fish and fish habitat associated with transport of concentrate from site under normal operating conditions (likelihood of spill considered low). Effects can be managed through design and standard mitigation.	Neutral – negligible effects on fish and fish habitat associated with transport of concentrate from site under normal operating conditions (likelihood of spill considered low). Effects can be managed through design and standard mitigation.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Neutral – transportation by rail requires construction of new spur line, resulting in effects on bird habitat during construction; rail transportation has the potential to increase risk of bird mortality, but to a lesser degree compared with truck transportation given the greater number of trucks needed.	Neutral – transportation by truck facilitated through use of existing roadways, so no effects on bird habitat during construction; however, truck transportation has the potential to increase risk of bird mortality to a greater degree compared to transportation by rail given increased frequency of truck trips.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Neutral – transportation by rail requires construction of new spur line, resulting in effects on wildlife habitat during construction; rail transportation has the potential to increase risk of wildlife mortality, but to a lesser degree compared with truck transportation given the greater number of trucks needed; however, mortality risk is increased due to the establishment of a new rail corridor.	Neutral – transportation by truck facilitated through use of existing roadways, so no effects on wildlife habitat during construction; however, truck transportation has the potential to increase risk of wildlife mortality to a greater degree compared to transportation by rail given increased frequency of truck trips.
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	Advantage – fewer GHG emissions relative to transportation by truck. Transportation by rail is considered more efficient given volumes of material to be transported daily.	Disadvantage – greater increase in GHG emissions from truck transportation compared with rail transportation.

VC/Criteria	Indicator	Concentrate by Rail	Concentrate by Truck
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Advantage – fewer emissions and corresponding health considerations relative to transportation by truck. Transportation by rail is considered more efficient.	Disadvantage – greater increase in emissions and corresponding health considerations from truck transportation compared with rail transportation.
Social and Economic Conditions			
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	Advantage – transportation by rail requires construction of new spur line connecting into existing ONR rail network, which has existing capacity to accommodate additional rail traffic; negligible effect on community services or accommodations.	Disadvantage – transportation by truck facilitated through use of existing highways, resulting in increased truck traffic along existing truck routes in neighbouring communities; additional heavy loads may result in greater wear and tear; additional turning lanes likely required into and out of the Project site to facilitate truck turning movements; negligible effect on community services or accommodations.
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	Neutral – new spur line extends rail traffic and infrastructure into area known for recreational activities (fishing, hunting) that coexist with existing rail infrastructure and traffic.	Neutral – increased truck traffic in an area known for recreational activities (fishing, hunting) that coexist with existing road infrastructure and traffic.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Neutral – potential effects on archaeological resources similar for both alternatives	Neutral – potential effects on archaeological resources similar for both alternatives
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Disadvantage – reduced number of employees required to operate trains relative to trucks.	Advantage – increased number of indirect workers (i.e., truck drivers) would be employed.

VC/Criteria	Indicator	Concentrate by Rail	Concentrate by Truck
Indigenous Peoples			
Indigenous Interests	<ul style="list-style-type: none"> • Change to Indigenous and treaty rights (includes Indigenous land and resources use) • Change in physical and cultural heritage • Change to governance, health, social and economic conditions of Indigenous nations 	Disadvantage – potential effects on Indigenous land and resource use marginally increased through required expansion of rail infrastructure to accommodate train movements and potential sensory disturbance from trains during operations; no heritage effects anticipated during operations.	Advantage – negligible effects on Indigenous land and resource use as a result of increased truck traffic along existing highways; no heritage effects anticipated during operations.
Technical / Economic			
Financial Costs	Alternative does not result in prohibitively high capital costs and operating costs.	Advantage – transportation by rail requires construction of new spur line, resulting in higher initial costs during construction; however, transportation by rail is considered more efficient than truck resulting in lower costs during operations. Overall, transportation by rail more cost-effective than by truck.	Disadvantage – transportation by truck facilitated through use of existing roadways, with reduced construction costs limited to any required upgrades (i.e., new turning lanes); however, transportation by truck is considered less efficient than rail resulting in higher costs during operations. Overall, transportation by truck less cost-effective than by rail.
Constructability	Alternative is constructable while avoiding undue or unnecessary design constraints.	Disadvantage – construction of 25 km of new rail spur (and associated water crossings) required for this alternative, which can be constructed using conventional construction methods; construction of a new spur line more extensive than adding turning lanes for trucks to the highway.	Advantage – construction of new turning lanes likely required for this alternative, which can be constructed using conventional construction methods; while temporary traffic management would be required, the addition of new turning lanes to the highway would require less effort and would occur within a smaller footprint than for a new 25 km spur line with watercourse crossings.
Proven Technology	Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.

VC/Criteria	Indicator	Concentrate by Rail	Concentrate by Truck
Safety	Alternative can be safely constructed and operated.	Advantage – alternative can be safely constructed and operated; trains isolated to dedicated rail lines with no new rail crossings.	Disadvantage – alternative can be safely constructed and operated; increased truck traffic along public roadways results in incremental increase in collision risk.
OVERALL		PREFERRED – Alternative has advantages in terms of lower potential effects on air quality, climate change, and health, as well as reduced interactions with public infrastructure and corresponding safety benefits. Despite initial construction costs, the efficiency and cost-effectiveness of moving concentrate by rail makes this alternative more economical.	NOT PREFERRED – Alternative has advantages in terms of lower impacts during construction, such as impacts to soils, vegetation communities, watercourses, bird and wildlife habitat; however, this alternative is less cost effective and results in increased effects from air emissions, GHG emissions, and associated effects on health during operations.

Based on the results of the alternatives assessment, rail transportation of concentrate from site was selected as the preferred alternative because this alternative is most cost effective and reduces effects on local infrastructure (i.e., roads, traffic), with advantages in terms of lower potential effects on air quality and climate change (i.e., reduced air and GHG emissions). On average, trains are approximately three to four times more fuel efficient than trucks (Railway Association of Canada 2024)). While the initial construction costs and potential effects on terrestrial and aquatic resources are greater during construction, the longer-term effects during operations are reduced relative to transporting concentrate by truck.

Transportation by truck has several limitations that would ultimately affect the overall ability to implement the Project. Compared with rail, the truck transportation alternative would likely result in greater emissions, and therefore greater potential effects on climate change, during operations, while also being less cost effective than transportation by rail. The approach to the transportation of concentrate by rail is similar to the method used at the existing Kidd Mine, which is located to the south of the Project and will share the existing rail line. Transportation by truck would create a greater number of employment opportunities due to the greater number of vehicles required (i.e., trucks vs. train. More trucks on the road moving concentrate each day would increase road traffic, with corresponding impacts on road conditions and increased maintenance for the MTO (e.g., wear and tear from heavy loads).

5.3.2.3 Transportation of Freight to Site

Step 1 - Initial Screening

The transportation of freight to mining sites is a strategic imperative that influences Project viability, safety, and profitability. Efficient freight transport supports prompt delivery of essential supplies, equipment, and raw materials to the site. It connects the mining operation to the outside world, enabling smooth operations. Timely delivery of equipment, machinery, and consumables is crucial for mining activities. Delays can disrupt production schedules, leading to increased costs and missed targets.

Two candidate alternatives were considered:

- Deliveries by truck: delivery via truck using existing provincial highways
- Deliveries by rail: delivery via rail using existing rail networks

Rail transport involves using trains to move freight from one location to another. It can be efficient for bulk transportation of goods over long distances. However, transportation of freight to site by rail was screened out given that deliveries are expected to originate from multiple locations, would be on different schedules/frequencies, and is not considered necessary given access to the site from an existing highway. Further, while technically possible, transportation by train would require additional planning, scheduling, and storage on site (i.e., bulk transport vs. on-time delivery) and would increase costs. Given the multiple origins of goods, costs associated with transportation to site via train would not be considered economically feasible since costs would be prohibitively high. Therefore, the initial screening identified only one feasible alternative (i.e., transportation by truck) for transportation of freight to the site. As a result of the initial screening, a comparative analysis was not completed.

5.3.2.4 Site Access Road to the Process Plant Area

Step 1 - Initial Screening

Access to the site will be required for personnel and material deliveries, as well as service, construction, and operational vehicle access. Providing safe and reliable access to the site in a manner that facilitates the safe operation of the mine and highway infrastructure is essential.

In terms of providing access to the site, three candidate alternatives were considered:

- SA1 - Construction of new access road to Process Plant Area: This alternative includes direct site access from the realigned Highway 655 (i.e., Alternative C1; see Section 5.3.2.1), going west toward the Process Plant. The access road would be approximately 600 m long
- SA2 - Upgrades to the existing secondary road west of lake complex: This alternative includes upgrading an existing secondary road south of the PA from the realigned Highway 655 going north toward the Process Plant. The access road would be approximately 5.4 km long
- SA3 – Use of abandoned remnant of Hwy 655 and then run west of TMF: This alternative includes using part of the abandoned remnant of Highway 655 south of the PA going north toward the TMF, then running west of the TMF toward the Process Plant. The access road would be approximately 5.7 km long

While there are technical and economic considerations for all three route alternatives (i.e., different route lengths and design constraints will affect relative costs and design), all three route alternatives were considered technically and economically feasible based on financial costs (i.e., construction and operation costs are not prohibitive), constructability (i.e., no unnecessary design constraints identified that would limit constructability), proven technology (i.e., alternatives to follow industry standards) and safety (i.e., alternatives can be safely constructed and operated). Therefore, all three alternatives were carried forward to the comparative analysis step. Figure 5.3 presents the alternatives that were considered in the comparative analysis.

Canada Nickel will also develop a network of internal site roads within the PA, which will link the main Project components. Since these roads will be within the PA in close proximity to mining infrastructure, with effects therefore influenced through the location of Project infrastructure, such effects are addressed in other sections (see Section 5.3.8.2). Further, effects from internal roads can be managed through design and standard mitigation. The location of internal roads will be based on the final layout of the other Project components to provide adequate connectivity, so no specific alternatives were considered for the onsite road network.

Step 2 - Examination of Potential Effects on Valued Components

The development of a site access road to the Project may have environmental consequences including habitat disruption due to vegetation clearing, soil erosion and sedimentation during construction, and effects on water quality due to runoff from roads. Increased vehicular traffic on the access road can result in noise pollution, disturbing wildlife and nearby communities. Dust and emissions from vehicles can also degrade air quality.

Step 3 - Comparative Analysis

Table 5.6 provides the comparative analysis between the three alternative means that were considered feasible.

Table 5.6 Site Access Comparative Analysis

VC/Criteria	Indicator	SA1 – Direct Access to Highway 655	SA2 – Access via Existing Road along Lakes	SA3 – Access via TMF and Remnant Highway 655
Natural Environment				
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral - negligible effects on terrain stability from traffic and equipment.	Neutral - negligible effects on terrain stability from traffic and equipment.	Neutral - negligible effects on terrain stability from traffic and equipment.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Advantage – lower potential effects on soil and topography during construction as a result of disturbance to existing soils.	Disadvantage – potential effects on soil and topography during construction as a result of disturbance to existing soils.	Disadvantage – potential effects on soil and topography during construction as a result of disturbance to existing soils.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Advantage - traffic and equipment will generate emissions during construction and operations that affect air quality. This alternative is shorter (i.e., approx. 600 m) than SA2 and SA3; therefore, fewer emissions expected during operation relative to the alternatives.	Disadvantage –traffic and equipment will generate emissions during construction and operations that affect air quality. This alternative would result in the second longest access road at approx. 5.4 km, although this road substantially exists; therefore, this alternative results in slightly fewer emissions during construction and operations than SA3.	Disadvantage –traffic and equipment will generate emissions during construction and operations that affect air quality. This alternative would result in the longest access road at approx. 5.7 km, thereby resulting in slightly greater emissions during construction and operation than either of the alternatives.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral - negligible change in emissions from traffic and equipment that affect ambient light.	Neutral - negligible change in emissions from traffic and equipment that affect ambient light.	Neutral - negligible change in emissions from traffic and equipment that affect ambient light.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Advantage – temporary impacts during construction, although reduced noise relative to alternatives given shorter travel distance.	Disadvantage – temporary impacts during construction, although reduced noise given substantial existence of existing roadway. Additional noise during operation relative to shorter alternative SA1, but closer to existing receptors than SA3.	Disadvantage – temporary impacts during construction, although reduced relative to SA2 given shorter extent of newly constructed access route (i.e., alternative would utilize portion of former Highway 655) and separation from existing receptors. Additional noise during operations relatives to SA1 and SA2 given longer access route.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Neutral – negligible effect on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effect on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effect on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Advantage – lower effects on surface water quality and quantity given the short length of road required. Effects can be managed through design and standard mitigation. Alternative requires 1 watercourse crossing.	Disadvantage – alternative requires upgrading existing road in proximity to series of lakes, with reduced setback to waterways, and requiring multiple culverts / bridges that may alter water flows and affect quality. Effects can be managed through design and standard mitigation. Alternative crosses approximately 3 watercourses.	Disadvantage – alternative requires construction of new access road adjacent to proposed TMF and reliance on portion of former Highway 655, thereby reducing number of new culverts required that may alter water flows and affect quality. Effects can be managed through design and standard mitigation. Alternative crosses approximately 2 watercourses.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Advantage – lower effects on vegetation communities, including woodlands and wetlands during construction as it is the shortest route.	Disadvantage – results in effects on vegetation communities, including woodlands and wetlands during construction through upgrades to existing roadway, although clearing along route would be lower relative to SA3.	Disadvantage – results in greater effects on vegetation communities, including woodlands and wetlands, during construction of new roadway portion of the access.
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Advantage – lower effects on fish and fish habitat given the short length of road required. Effects can be managed through design and standard mitigation. Alternative requires 1 watercourse crossing.	Disadvantage – alternative requires upgrading existing road in proximity to series of lakes (fish habitat), with reduced setback to waterways, and requiring multiple culverts / bridges that may affect fish habitat. Alternative crosses approximately 3 watercourses.	Disadvantage – alternative requires construction of new access road adjacent to proposed TMF and reliance on portion of former Highway 655, thereby reducing number of new culverts required that may affect fish habitat. Alternative crosses approximately 2 watercourses.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Advantage – lower effects on bird habitat during construction as it is the shortest route. Effects can be managed through mitigation, siting or design.	Disadvantage – results in effects on bird habitat and disturbance to birds during construction, although effects would be lower relative to SA3 given existing roadway.	Disadvantage – results in effects on bird habitat and disturbance to birds during construction of new roadway portion of the access.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Advantage – lower effects on wildlife habitat during construction as it is the shortest route. Effects can be managed through mitigation, siting or design.	Disadvantage – results in effects on wildlife habitat and disturbance to wildlife during construction, although effects would be lower relative to SA3 given existing roadway.	Disadvantage – results in effects on wildlife habitat and disturbance to wildlife during construction of new roadway portion of the access.

VC/Criteria	Indicator	SA1 – Direct Access to Highway 655	SA2 – Access via Existing Road along Lakes	SA3 – Access via TMF and Remnant Highway 655
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	<p>Advantage – traffic and equipment constructing and using the road will generate GHG emissions.</p> <p>This alternative is shorter (i.e., approx. 600 m) than SA2 and SA3; therefore, fewer emissions expected relative to the alternatives.</p>	<p>Disadvantage – traffic and equipment constructing and using the road will generate GHG emissions.</p> <p>This alternative would result in the second longest access road at approx. 5.4 km, although this road substantially exists; therefore, this alternative results in slightly fewer emissions than SA3.</p>	<p>Disadvantage – traffic and equipment constructing and using the road will generate GHG emissions.</p> <p>This alternative would result in the longest access road at approx. 5.7 km, thereby resulting in slightly greater emissions than either of the alternatives.</p>
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Neutral – negligible effects on health conditions as a result of alternative site access.	Neutral – negligible effects on health conditions as a result of alternative site access.	Neutral – negligible effects on health conditions as a result of alternative site access.
Social and Economic Conditions				
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	Neutral – no interaction between selection of site access and services and infrastructure. Each alternative requires new entrance to Highway 655.	Neutral – no interaction between selection of site access and services and infrastructure. Each alternative requires new entrance to Highway 655.	Neutral – no interaction between selection of site access and services and infrastructure. Each alternative requires new entrance to Highway 655.
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	Advantage – potential effects on land and resource use considered less than alternatives given limited extent of new access road.	Disadvantage – potential effects on land and resource use considered similar to alternative SA3.	Disadvantage – potential effects on land and resource use considered similar to alternative SA2.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Neutral – minimal effects on heritage resources related to road construction. Effects can be managed through mitigation, siting or design.	Neutral – minimal effects on heritage resources related to alternative. Effects can be managed through mitigation, siting or design.	Neutral – minimal effects on heritage resources related to alternative. Effects can be managed through mitigation, siting or design.
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Neutral – no interaction between selection of site access and economic conditions.	Neutral – no interaction between selection of site access and economic conditions.	Neutral – no interaction between selection of site access and economic conditions.
Indigenous Peoples				
Indigenous Interests	<ul style="list-style-type: none"> Change to Indigenous and treaty rights (includes Indigenous land and resources use) Change in physical and cultural heritage Change to governance, health, social and economic conditions of Indigenous nations 	Advantage – potential effects on Indigenous land and resource use and heritage resources considered less than alternatives given limited extent of new access road.	Disadvantage – potential effects on Indigenous land and resource use considered similar to alternative SA3.	Disadvantage – potential effects on Indigenous land and resource use considered similar to alternative SA2.
Technical / Economic				
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	Advantage – alternative requires a new highway entrance although is substantially shorter than alternatives, therefore alternative is substantially less expensive than the other alternatives.	Disadvantage – alternative requires a new highway entrance and upgrading of existing secondary road, as well as new/replacement culverts, which would result in substantially more cost than alternative SA1 but comparable to SA3. Costs of maintenance (e.g., snow clearing, surfacing) of a longer road would be higher during operations.	Disadvantage – alternative requires a new highway entrance and construction of new access road (utilizing a portion of former Highway 655 will reduce overall costs), as well as new/replacement culverts, which would result in substantially more cost than alternative SA1 but comparable to SA2. Costs of maintenance (e.g., snow clearing, surfacing) of a longer road would be higher during operations.

VC/Criteria	Indicator	SA1 – Direct Access to Highway 655	SA2 – Access via Existing Road along Lakes	SA3 – Access via TMF and Remnant Highway 655
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints. 	Advantage – construction of new highway entrance required for this alternative, which can be constructed using conventional construction methods; substantially less complicated with smaller work area / effort than alternatives SA2 and SA3.	Disadvantage – construction of new highway entrance and upgrades to existing roadway required for this alternative, which can be constructed using conventional construction methods; substantially more effort and greater extent of work than alternative SA1.	Disadvantage – construction of new highway entrance and roadway required for this alternative, while using portion of former Highway 655, which can be constructed using conventional construction methods; substantially more effort and greater extent of work than alternative SA1.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program. 	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated. 	Neutral – alternative can be safely constructed and operated. Safety addressed through proper highway entrance design.	Neutral – alternative can be safely constructed and operated. Negligible increased safety risk due to additional access road length and meandering road pattern following existing roadway, although upgrades would address any safety concerns. Safety addressed through proper highway entrance design.	Neutral – alternative can be safely constructed and operated. Negligible increased safety risk due to additional access road length. Safety addressed through proper highway entrance design.
OVERALL		PREFERRED – This alternative has advantages in terms of construction and operational cost and constructability, as well as lower effects on various criteria due to reduced length of access road and construction footprint.	NOT PREFERRED – This alternative has disadvantages in terms of potential effects on air quality and climate change (emissions), noise, soils, surface water and fish habitat, vegetation, and birds and wildlife habitat. This alternative would also result in increased costs during construction and operation relative to SA1 and greater effort to construct.	NOT PREFERRED – This alternative has disadvantages in terms of potential effects on air quality and climate change (emissions), noise, soils, surface water and fish habitat, vegetation, and birds and wildlife habitat. This alternative would also result in increased costs during construction and operation relative to SA1 and greater effort to construct.

Based on the results of the alternatives assessment, alternative SA1 was selected as the preferred site access alternative because of its ease on construction, reduce length/footprint, and therefore correspondingly reduced cost relative to the alternatives, which require construction/upgrading of new access roads. Each alternative requires a new entrance to Highway 655 to allow for safe access to and from the site. Alternative SA1 has substantial advantages in terms of lower potential effects on soil, air quality and climate change (i.e., shorter site access road reduces potential emissions during operations), vegetation (wetlands, woodlands) and corresponding habitat (birds, wildlife, fish) due to its small footprint.

Alternatives SA2 and SA3 were not chosen because both alternatives would be substantially more costly during construction and operations requiring a greater footprint to construct and/or upgrade existing roadways, leading to a longer access road during operations that would not be necessary given proximity of the realigned Highway 655 to the Process Plant. As a result, alternatives SA2 and SA3 could potentially result in greater effects to soil, air quality, acoustic environment, birds and bird habitats, wildlife and wildlife habitat, surface water, fish and fish habitat, and climate change. The existing portion of SA3 (i.e., existing portion of Highway 655) would still be used to access to the site, particularly during construction and as an alternate access to the TMF during operation.

5.3.3 Energy and Power Sources

Step 1 - Initial Screening

Electrical power will be required to operate the Project. At maximum production, approximately 370 megawatts of power generation capacity are anticipated to be required to power mining infrastructure, including the processing plant, crusher facilities, and ancillary buildings. This also includes the electrification of the trolley assist system proposed to reduce fuel consumption and corresponding emissions for the fleet of mine haul trucks within the Open Pit. Power must be provided in a reliable, accessible and economically viable manner.

The following candidate alternatives were considered:

- Renewable energy (on site solar or wind)
- Diesel or fuel generation
- Connection to the grid (transmission line)
- Natural gas power plant
- Small Modular Reactor (SMR)

These alternatives were selected to be considered as existing and accessible technologies used in the province of Ontario. During construction, the only feasible alternative is the use of temporary diesel generators until such time as the operational power source is available due to the remote nature of the Project location and distance from the grid or possible natural gas lines. This low-cost option is a standard method during construction and will be implemented until such time as an alternate, long-term power source is available. Therefore, no other technical and economically feasible alternatives were considered during construction.

Renewable energy was screened out for both construction and operation since sources cannot provide enough output to meet electrical power requirements and/or provide consistent uninterrupted power, and therefore, is not considered technically feasible for the Project.

Diesel or fuel generation was screened out during operations since this alternative alone would result in prohibitively higher costs if used to meet total operational power needs. Therefore, this alternative was eliminated because it was not considered economically feasible and would ultimately affect the overall ability to implement the Project.

A natural gas-powered plant was also screened out as there are no natural gas lines located near the Project. The closest natural gas source to the Project is located more than 20 km from the site and would require the construction and operation of a new gas line to facilitate this alternative. As such, this alternative is not considered to be technically or economically feasible for this Project.

The use of one or more SMRs was also explored for the Project; however, this alternative would result in prohibitively higher costs in order to meet total operational power needs. Therefore, this alternative was eliminated because it was not considered economically feasible and would ultimately affect the overall ability to implement the Project.

Therefore, the preferred alternative for energy and power source is to connect to the existing transmission network to power the Project during operation, as well as during construction once the transmission line connection is complete. Diesel generators will be used temporarily during construction (and as a backup during operations in the event of a power outage). Given the absence of other technically or economically feasible alternatives identified during the initial screening, a comparative analysis was not completed.

5.3.4 Water Supply Sources

5.3.4.1 Potable Water Supply

Step 1 - Initial Screening

A potable water supply and distribution system is required to provide approximately 80,000 litres (L) per day needed for mining personnel working at the Project for domestic use (i.e., drinking water, eyewash, safety shower, hand washing, toilets). A safe and reliable source of potable water is needed for the Project and sources should be relatively close to the mine site, since additional infrastructure would increase construction and maintenance effort.

Two candidate alternatives were considered:

- Groundwater source (within the PA)
- Surface water source (adjacent to the PA)

Both alternatives were considered technically and economically feasible based on financial costs (i.e., costs are not prohibitive for Project implementation), constructability (i.e., no unnecessary design constraints identified), proven technology (i.e., alternatives to follow industry standards) and safety (i.e., alternatives can be safely constructed and operated). Therefore, both alternatives were carried forward to the comparative analysis step.

Step 2 - Examination of Potential Effects on Valued Components

Using surface water as the source of potable water supply for the Project may reduce the availability of water in the source, thereby impacting downstream flows and water users (fish, people). Similarly, groundwater extraction for potable water may lead to aquifer depletion or reduced groundwater table and corresponding adverse affects on local ecosystems.

Step 3 – Comparative Analysis

Table 5.7 provides the comparative analysis between the alternative means that were considered feasible.

Table 5.7 Potable Water Supply Comparative Analysis

VC/Criteria	Indicator	Groundwater Source	Surface Water Source
Natural Environment			
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral - negligible effects on terrain stability from potable water supply.	Neutral - negligible effects on terrain stability from potable water supply.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Neutral – negligible effects on soil quality and quantity from potable water supply.	Neutral – negligible effects on soil quality and quantity from potable water supply.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Neutral - negligible effects on air quality from potable water supply.	Neutral - negligible effects on air quality from potable water supply.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral - negligible effects on light from potable water supply.	Neutral - negligible effects on light from potable water supply.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral - negligible effects on noise and vibration from potable water supply.	Neutral - negligible effects on noise and vibration from potable water supply.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Disadvantage – potential to decrease groundwater quantity and flow from prolonged water taking, which may require additional management and mitigation, although adequate source exists to meet the needs of the Project throughout operations. Concerns with water quality/suitability can be addressed through appropriate treatment.	Advantage – reduced potential effects on groundwater anticipated.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Advantage – reduced potential effects on surface water anticipated.	Disadvantage – potential effects on surface water quantity through extraction, which may require additional management and mitigation; limited potential surface water sources exist that would provide required quantity of potable water outside of the influence of mining activities. Concerns with water quality/suitability can be addressed through appropriate treatment.

VC/Criteria	Indicator	Groundwater Source	Surface Water Source
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> • Change in vegetation communities and species diversity • Change in riparian function • Change in wetland form and function 	Neutral - negligible effects on vegetation or wetlands due to altered water regime in from a potable water supply well.	Neutral - negligible effects on vegetation from potable water supply from a watercourse or lake. Water takings relative to volumes in a lake or flows in a watercourse would be negligible.
Fish and Fish Habitat	<ul style="list-style-type: none"> • Change in fish habitat • Change in fish health 	Neutral - negligible effects on fish and fish habitat from potable water supply.	Neutral – potential for fish entrainment in intake structures and effects on fish habitat, although effects can be mitigated through proper design (i.e., in-take protection) and flow/needs management. Water takings relative to volumes in a lake or flows in a watercourse would be negligible.
Birds and Bird Habitats	<ul style="list-style-type: none"> • Change in habitat • Change in mortality risk 	Neutral - negligible effects on birds and bird habitats from potable water supply.	Neutral - negligible effects on birds and bird habitats from potable water supply.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> • Change in habitat • Change in movement • Change in mortality risk • Change in wildlife health 	Neutral - negligible effects on wildlife from potable water supply.	Neutral - negligible effects on wildlife from potable water supply.
Climate Change	<ul style="list-style-type: none"> • Change in release of GHG to the environment • Change in carbon capture 	Neutral - negligible effects on climate change from potable water supply.	Neutral - negligible effects on climate change from potable water supply.
Health	<ul style="list-style-type: none"> • Change physical health • Change in mental health and social wellbeing • Change in community safety 	Neutral – No interaction between health and selection of potable water supply because the alternative would be located within or adjacent to the PA.	Neutral – No interaction between health and selection of potable water supply because the alternative would be located within or adjacent to the PA.

VC/Criteria	Indicator	Groundwater Source	Surface Water Source
Social and Economic Conditions			
Services and Infrastructure	<ul style="list-style-type: none"> • Change in demand for services and infrastructure • Change in accommodation availability • Change in demand for transportation infrastructure 	Neutral – No interaction between services and infrastructure and selection of potable water supply because the alternative would be located within or adjacent to the PA.	Neutral – No interaction between services and infrastructure and selection of potable water supply because the alternative would be located within or adjacent to the PA.
Land and Resource Use	<ul style="list-style-type: none"> • Change in land use designations and private property • Change in recreation • Change in resource use 	Neutral – negligible effects on land and resource use because wells would be installed within or adjacent to the PA. Effects can be managed through mitigation, siting or design.	Neutral – negligible effects on land and resource use because the alternative would be installed within or adjacent to the PA. Effects can be managed through mitigation, siting or design.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> • Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Neutral – negligible effects on heritage resources related to road construction. Effects can be managed through mitigation, siting or design.	Neutral – negligible effects on heritage resources related to alternative. Effects can be managed through mitigation, siting or design.
Economic Conditions	<ul style="list-style-type: none"> • Change in employment • Change in business • Change in provincial economy 	Neutral - negligible effects on economic conditions from potable water supply.	Neutral - negligible effects on economic conditions from potable water supply.
Indigenous Peoples			
Indigenous Interests	<ul style="list-style-type: none"> • Change to Indigenous and treaty rights (includes Indigenous land and resources use) • Change in physical and cultural heritage • Change to governance, health, social and economic conditions of Indigenous nations 	Neutral – negligible effect on Indigenous interests because the alternative would be located within or adjacent to the PA. Effects can be managed through mitigation, siting or design.	Neutral – negligible effect on Indigenous interests because the alternative would be located within or adjacent to the PA. Effects can be managed through mitigation, siting or design.

VC/Criteria	Indicator	Groundwater Source	Surface Water Source
Technical / Economic			
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	<p>Advantage – this alternative is economically feasible to implement, but there would be costs associated with pumping and treatment infrastructure.</p> <p>In addition, alternative has reduced concerns for water quality given existing baseline conditions and reduced influence from sources of potential contamination relative to surface water</p>	<p>Disadvantage – this alternative is economically feasible to implement, but there would be costs associated with pumping and treatment infrastructure.</p> <p>However, there are limited potential surface water sources that would provide required quantity of potable water.</p>
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints. 	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program. 	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated. 	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		<p>PREFERRED –</p> <p>This alternative has advantages in terms of a safe and reliable source as well as reduced potential effects on surface water.</p>	<p>NOT PREFERRED –</p> <p>This alternative has advantages in terms of reduced potential effects on groundwater, although limited potential surface water sources exist that would provide required quantity of potable water outside of the influence of mining activities. Greater degree of water quality treatment required compared to groundwater alternative.</p>

Groundwater was selected as the preferred source of potable water because this alternative has advantages in terms of providing a safe and reliable source of potable water to meet the needs of the Project with reduced potential effects on surface water. Potable water will be supplied by groundwater sourced from water wells located west of the Process Plant at a rate of approximately 80,000 L/d. The fresh water will be treated if needed to meet provincial drinking water standards.

Surface water was not chosen because of the greater degree of water quality treatment typically required for surface water as compared to groundwater.

5.3.4.2 Process Plant Water Supply

Step 1 – Initial Screening

Water will be required to process ore at a rate of up to 120,000 tonnes per day. To meet the required demand, alternatives for the Process Plant water supply were identified that could supply the required volume.

Three candidate alternatives were considered:

- Closed loop – This alternative would involve recycling contact water stored in collection ponds (including from the TMF and from dewatering of the Open Pit). Water from collection ponds would then be supplied to the Process Plant
- Open loop – This alternative would involve supplying surface water to the Process Plant and discharging effluent to the environment
- Combined – The combined alternative would involve a combination of the first two alternatives (i.e., water supply would include recycled contact water from collection ponds supplemented with water from surface water sources)

All alternatives were considered technically and economically feasible based on financial costs (i.e., construction and operating costs are not prohibitive), constructability (i.e., no unnecessary design constraints identified), proven technology (i.e., alternatives to follow industry standards) and safety (i.e., alternatives can be safely constructed and operated). Therefore, all three alternatives were carried forward to the comparative analysis step.

Step 2 – Examination of Potential Effects on Valued Components

Using surface water as the Process Plant water supply may affect baseflows to creeks and wetlands, potentially affecting downstream users as well as fish, depending on volume of water required.

Using recycled contact water from collection ponds in a closed loop system would limit Project effects on surface water.

Step 3 – Comparative analysis

Table 5.8 provides the comparative analysis between the alternative means that were considered feasible.

Table 5.8 Process Plant Water Supply Comparative Analysis

VC/Criteria	Indicator	Closed Loop	Open Loop	Combined
Natural Environment				
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral – no interaction between terrain stability and Process Plant water supply.	Neutral – no interaction between terrain stability and Process Plant water supply.	Neutral – no interaction between terrain stability and Process Plant water supply.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Neutral – no interaction between soil quality and quantity and Process Plant water supply.	Neutral – no interaction between soil quality and quantity and Process Plant water supply.	Neutral – no interaction between soil quality and quantity and Process Plant water supply.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Neutral – no interaction between air quality and Process Plant water supply.	Neutral – no interaction between air quality and Process Plant water supply.	Neutral – no interaction between air quality and Process Plant water supply.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral – no interaction between ambient light and Process Plant water supply.	Neutral – no interaction between ambient light and Process Plant water supply.	Neutral – no interaction between ambient light and Process Plant water supply.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral – no interaction between noise and vibration and Process Plant water supply.	Neutral – no interaction between noise and vibration and Process Plant water supply.	Neutral – no interaction between noise and vibration and Process Plant water supply.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Neutral – no effects on groundwater anticipated because reclaimed water from the TMF and contact water collection system will not require groundwater taking.	Neutral - no effects on groundwater are anticipated because a groundwater resource will not be disturbed or drawn from.	Neutral - no effects on groundwater are anticipated because a groundwater resource will not be disturbed or drawn from.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Advantage – closed loop alternative will limit Project effects on surface water.	Disadvantage – greater potential for effects on surface water due to increased surface water requirements.	Disadvantage – greater potential for effects on surface water due to increased surface water requirements.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Neutral – no interaction between use of reclaim water for process water supply and vegetation communities and wetlands.	Neutral – effects on vegetation and wetland environments associated with surface water taking can be managed through standard mitigation.	Neutral – effects on vegetation and wetland environments associated with surface water taking can be managed through standard mitigation.
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Advantage – no interaction between use of reclaimed water for process water supply and fish and fish habitat.	Disadvantage – greater potential for effects on fish habitat due to volume of water required from a fresh water source resulting in reductions in baseflows to creeks and wetlands.	Disadvantage – greater potential for effects on fish habitat due to volume of water required from a fresh water source resulting in reductions in baseflows to creeks and wetlands.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Neutral – no interaction between use of reclaimed water for process water supply and birds and bird habitats.	Neutral – limited potential for effects from surface water taking for process water supply on birds and bird habitats.	Neutral – limited potential for effects from combined alternative on birds and bird habitats.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Neutral – no interaction between use of reclaimed water for process water supply and wildlife and wildlife habitat.	Neutral – limited potential for effects from surface water taking for process water supply on wildlife and wildlife habitat.	Neutral – limited potential for effects from combined alternative on wildlife and wildlife habitat.
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	Neutral – no interaction between climate change and Process Plant water supply.	Neutral – no interaction between climate change and Process Plant water supply.	Neutral – no interaction between climate change and Process Plant water supply.
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Neutral – no interaction between health and Process Plant water supply.	Neutral – no interaction between health and Process Plant water supply.	Neutral – no interaction between health and Process Plant water supply.

VC/Criteria	Indicator	Closed Loop	Open Loop	Combined
Social and Economic Conditions				
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	Neutral – No interaction between services and infrastructure and process water supply.	Neutral – No interaction between services and infrastructure and process water supply.	Neutral – No interaction between services and infrastructure and process water supply.
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	Advantage – No effects on land and resource use are anticipated because infrastructure will be located in the PA or near vicinity and will not result in additional LRU access or navigation restrictions.	Disadvantage – Potential for navigation restrictions around surface water intake structure	Disadvantage – Potential for navigation restrictions around surface water intake structure
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Advantage – limited effects on heritage resources related to alternative. Effects can be managed through mitigation, siting or design.	Disadvantage - Surface water taking has potential to affect heritage resources, which may require additional mitigation.	Disadvantage - Surface water taking has potential to affect heritage resources, which may require additional mitigation.
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Neutral – no interaction between process water supply and economic conditions.	Neutral – no interaction between process water supply and economic conditions.	Neutral – no interaction between process water supply and economic conditions
Indigenous Peoples				
Indigenous Interests	<ul style="list-style-type: none"> Change to Indigenous and treaty rights (includes Indigenous land and resources use) Change in physical and cultural heritage Change to governance, health, social and economic conditions of Indigenous nations 	Advantage – No interaction between the closed loop alternative and traditional land and resource use.	Disadvantage – Surface water taking has the potential to affect heritage resources and Indigenous land and resources use, which may require additional mitigation. Surface water taking at the volume required for the process water supply could also result in localized navigation restrictions around the intake, affecting resource use and traditional activities	Disadvantage – Surface water taking in the combined alternative has the potential to affect heritage resources and Indigenous land and resources use, which may require additional mitigation. Surface water taking at the volume required for the process water supply could also result in localized navigation restrictions around the intake, affecting resource use and traditional activities
Technical / Economic				
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	Advantage – alternative is less expensive than an open loop (or combined) system.	Disadvantage – this alternative incurs greater construction costs related to the surface water taking required for an open loop system. Surface water taking would not provide treatment efficiencies like a reclaim system would, increasing costs.	Disadvantage – this alternative incurs greater construction costs related to the surface water taking required for an open loop system. Surface water taking would not provide treatment efficiencies like a reclaim system would, increasing costs.
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints 	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program 	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated 	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		PREFERRED – This alternative has advantages in terms of lower potential effects on surface water, fish and fish habitat, land and resource use, and Indigenous interest. It is also less costly to implement than the other alternatives.	NOT PREFERRED – This alternative has limitations that would ultimately affect the overall ability to implement the Project.	NOT PREFERRED – This alternative has limitations that would ultimately affect the overall ability to implement the Project.

Based on the results of the alternatives assessment, closed loop was selected as the preferred alternative because this alternative has advantages in terms of lower potential effects on surface water, fish and fish habitat, land and resource use, and Indigenous interest (i.e., recycled contact water used in a closed-loop system does not affect VCs as much as the other alternatives).

Surface water was not chosen because it has several limitations that would ultimately affect the overall ability to implement the Project. Taking surface water as the primary source for process water would have a greater environmental effect over using reclaimed water based on the potential to affect surface water and fish and fish habitat. Surface water taking would not provide treatment efficiencies like a reclaim system would. Establishing a new surface water source at the volume required for the primary process water supply could also result in localized navigation restrictions around the intake, affecting resource use and traditional activities.

5.3.5 Aggregate Supply Sources

Step 1 – Initial Screening

Aggregate will be required for the construction of numerous Project components, including specific construction and maintenance needs for roads, pads, TMF filter zones and embankments, and other Project facilities. Alternative aggregate sourcing methods include using quarries operated by third-parties or using mined waste rock with suitable geochemistry, or creating new Canada Nickel owned and operated aggregate sources located outside the Project Area.

The assessment focused on design/technology alternatives, as location will be dependent on sources that meet the required material characteristics within close proximity to the Project that would limit haul distances, overall footprint and reduce the potential for environmental effects consistent with regulatory standards.

Three candidate alternatives were considered:

- A1 - use mined waste rock and aggregate sources inside the PA
- A2 - use third-party quarries and/or pits outside of the PA

Both alternatives are commonly used in the industry and could be effectively and reliably implemented from a technical perspective. Mine rock for construction of roads or other uses early in the construction phase may not be available when required, and therefore alternate sources may be required to address this initial need. However, given that relying on any one source of aggregate would not be technical feasible given the availability of mine rock and aggregate demand of the Project, a comparative analysis was not completed.

Mined waste rock will be used as the primary source of aggregate material on site; however, given the limitations on its availability at the outset of construction, additional aggregate resources will be required. A combination of third-party aggregate sources plus using mined waste rock will result in the most cost-effective option that will provide the flexibility needed to supply the materials required for the Project.

5.3.6 Water Crossing Structures and Locations

Project development will necessitate the construction of various water crossing structures to accommodate water diversions and the realignment of a highway intersecting multiple watercourses. These structures are critical to maintaining the integrity of both the natural water flow and the transportation infrastructure. Given the current stage of the Project, specific details regarding the number and exact locations of these water crossings are not yet available. However, it is anticipated that the Project will involve a combination of culverts, bridges, and other engineered solutions designed to reduce effects while maintaining hydrological connectivity. The selection of appropriate water crossing structures will be guided by applicable regulations, as well as a thorough assessment of site-specific conditions, including hydrology, topography, and ecological considerations.

As the Project progresses, locations and design specifications for each water crossing will be identified. This information will be integrated into the final Project design to maintain compliance with regulatory requirements and best practices for environmental stewardship. Continuous monitoring and adaptive management strategies will be employed to address any unforeseen challenges and to protect the long-term sustainability of the watercourses affected by the Project.

5.3.7 Water Diversion Alternatives

5.3.7.1 Water Diversion Methods

Step 1 – Initial Screening

There are a number of small watercourses and areas of overland drainage that flow towards and into the PA, which if unmanaged would drain into the proposed mine infrastructure. To manage this water, and to separate external flows from contact water being managed within the mine site, non-contact water will be diverted around Project facilities and around the PA to reduce the amount of water that must be managed. Alternatives for the overall management of non-contact water that were considered include:

- **Diversion:** This alternative includes artificially collecting and diverting natural runoff from outside of the mine site around Project infrastructure to a downstream receiver (i.e., channel diversion, ditching)
- **Pumping:** This alternative includes artificially collecting and pumping natural runoff from outside of the mine site around Project infrastructure to a downstream receiver (i.e., pipeline)
- **Do nothing:** This alternative involves not doing anything about non-contact water draining through the PA

Pumping is not considered economically feasible as it would require pumping in perpetuity. Doing nothing about non-contact water in the PA is also not technically or economically feasible since this alternative would result in non-contact water becoming contact water, unnecessarily increasing the need for additional contact water management. Therefore, diversion of non-contact water around Project components was chosen as the only feasible alternative in terms of the overall management of non-contact water. As a result of the initial screening, a comparative analysis was not required

5.3.7.2 North Driftwood River Diversion Routes

Step 1 – Initial Screening

Non-contact water diversions including the North Driftwood River Diversion Channel are a part of the water management system for the Project. The non-contact water diversions are generally to be installed along the perimeter of the PA to divert flows away from Project components. The goal of the North Driftwood River Diversion Channel is to re-direct flows currently discharging from Martin Lake westward along the realigned Highway 655 corridor and back into the North Driftwood River downstream of the mine site in a manner that incorporates appropriate environmental considerations.

The following candidate alternatives were considered:

- ND1 – Diversion Channel in Existing Watercourse Valley: alignment starts at Martin Lake and heads west to cross the realigned corridor. The alignment then turns northwest to meet an unnamed tributary of the North Driftwood River, which would be enlarged to its confluence with the North Driftwood River
- ND2 – Diversion Channel in New Perimeter Valley: alignment starts at Martin Lake and runs west to cross the realigned corridor, then turns north and runs parallel to the west side of the realigned corridor to a downstream tie-in point with the North Driftwood River northwest of the site
- ND3 – Diversion Channel out of Gerry Lake (Detailed Project Description [Canada Nickel 2022] alternative): alignment starts at Gerry Lake and heads west to cross the realigned corridor, then turns north to meet an unnamed tributary of the North Driftwood River
- ND4 - Diversion Channel in New Perimeter Valley: alignment start at Martin Lake and runs west towards the realigned corridor, then turns north and runs parallel to the east side of the realigned corridor to a downstream tie-in point with the North Driftwood River northwest of the site

All four alternatives are considered technically and economically feasible based on financial costs (i.e., costs are acceptable for Project implementation), constructability (i.e., no unnecessary design constraints identified), proven technology (i.e., alternatives to follow industry standards), and safety (i.e., alternatives can be safely constructed and operated). Of note, alternative ND1 results in higher Project expenditures, due to larger diversion channel length. Nevertheless, alternative ND1 is considered feasible and was carried forward to the comparative analysis step.

Step 2 – Examination of Potential Effects on Valued Components

Diversion channels may disrupt the natural flow of rivers and the function of flood plains. Downstream environmental effects of diversion channels may include loss of habitat, due to altered flows, the loss of flood plains and wetlands, and habitat fragmentation for aquatic species and wildlife. The diversion provides an opportunity to offset impacts on fish and fish habitat, although construction of the diversion itself may affect fish and fish habitat through temporary changes in water quality and/or disruption of fish life processes.

Step 3 – Comparative Analysis

Table 5.9 provides the comparative analysis between the three alternative means that were considered feasible.

Table 5.9 North Driftwood Diversion Comparative Analysis

VC/Criteria	Indicator	ND1 – Diversion Channel in Existing Watercourse Valley	ND2 – Diversion Channel in New Perimeter Valley (west of realigned corridor)	ND3 – Diversion Channel out of Gerry Lake (Detailed Project Description [Canada Nickel 2022] alternative)	ND4 – Diversion Channel in New Perimeter Valley (east of realigned corridor)
Natural Environment					
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral – negligible effects on terrain stability from alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on terrain stability from alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on terrain stability from alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on terrain stability from alternative. Effects can be managed through design and standard mitigation.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Disadvantage – footprint of ND1 alternative is the largest, therefore more potential for effects on soil quality and quantity.	Advantage – footprint of ND2 is smaller than ND1 and ND3, therefore less potential for effects on soil quality and quantity.	Disadvantage – footprint of ND3 alternative is longer than ND2 and ND4 therefore more potential for effects on soil quality and quantity.	Advantage – footprint of ND4 is the smallest, therefore less potential for effects on soil quality and quantity.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Neutral – negligible effects on air emissions related to diversion channel construction. Effects can be managed through standard mitigation.	Neutral – negligible effects on air emissions related to diversion channel construction. Effects can be managed through standard mitigation.	Neutral – negligible effects on air emissions related to diversion channel construction. Effects can be managed through standard mitigation.	Neutral – negligible effects on air emissions related to diversion channel construction. Effects can be managed through standard mitigation.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral – negligible emissions from this alternative that affect ambient light.	Neutral – negligible emissions from this alternative that affect ambient light.	Neutral – negligible emissions from this alternative that affect ambient light.	Neutral – negligible emissions from this alternative that affect ambient light.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Disadvantage – alternative ND1 is the longest (approx. 11.3 km), which has a higher potential to result in changes in noise and vibration during construction.	Advantage – alternative ND2 is shorter (approx. 7.7 km) than ND1 and ND3 which has a lower potential to result in changes in noise and vibration during construction.	Disadvantage – alternative ND3 is longer (approx. 8.6 km) than ND2 and ND4, which has a higher potential to result in changes in noise and vibration during construction.	Advantage – alternative ND4 is the shortest (approx. 5.7 km), which has a lower potential to result in changes in noise and vibration during construction.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Neutral – negligible effects on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Disadvantage – alternative ND1 is the longest (approx. 11.3 km), which has a higher potential to result in changes in hydrological and sediment transport regimes.	Advantage – alternative ND2 is shorter (approx. 7.7 km) than ND1 and ND3 which has a lower potential to result in changes in hydrological and sediment transport regimes.	Disadvantage – alternative ND3 is longer (approx. 8.6 km) than ND2 and ND4, which has a higher potential to result in changes in hydrological and sediment transport regimes.	Advantage – alternative ND4 is the shortest (approx. 5.7 km), which has a lower potential to result in changes in hydrological and sediment transport regimes.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Disadvantage – footprint of ND1 alternative is the largest (approx. 33.8 ha), therefore more potential for effects on vegetation, riparian and wetland environments.	Advantage – footprint of ND2 is smaller (approx. 23.2 ha) than ND1 and ND3, therefore less potential for effects on vegetation, riparian and wetland environments.	Disadvantage – footprint of ND3 alternative is larger (approx. 25.8 ha) than ND2 and ND4, therefore more potential for effects on vegetation, riparian and wetland environments.	Advantage – footprint of ND4 is the smallest (approx. 17.3 ha), therefore less potential for effects on vegetation, riparian and wetland environments.
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Disadvantage – alternative ND1 would directly affect the greatest extent of existing North Driftwood River (compared to ND2, ND3 and ND4) and its habitat requiring Project offsetting under the <i>Fisheries Act</i> . Alternative requires 4 watercourse crossings, but also would require substantive work within the existing unnamed Tributary of the North Driftwood to increase capacity of that watercourse, essentially overprinting the existing watercourse along its length, to convey the diversion flows.	Neutral – alternative ND2 would directly affect a similar extent of the existing North Driftwood River as ND3 and its habitat requiring Project offsetting under the <i>Fisheries Act</i> . Alternative requires 4 watercourse crossings.	Neutral – alternative ND3 would directly affect a similar extent of the existing North Driftwood River as ND2 and its habitat requiring Project offsetting under the <i>Fisheries Act</i> . Alternative requires 5 watercourse crossings.	Advantage – alternative ND4 would directly affect the shortest reach of the existing North Driftwood River (compared to ND1, ND2 and ND3) and its habitat requiring Project offsetting under the <i>Fisheries Act</i> . Alternative requires 8 watercourse crossings.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Disadvantage – footprint of ND1 alternative is the largest, therefore more potential for effects on birds and bird habitats.	Advantage – footprint of ND2 is smaller than ND1 and ND3, therefore less potential for effects on birds and bird habitats.	Disadvantage – footprint of ND3 alternative is longer than ND2 and ND4 therefore more potential for effects on birds and bird habitats.	Advantage – footprint of ND4 is the smallest, therefore less potential for effects on birds and bird habitats.

VC/Criteria	Indicator	ND1 – Diversion Channel in Existing Watercourse Valley	ND2 – Diversion Channel in New Perimeter Valley (west of realigned corridor)	ND3 – Diversion Channel out of Gerry Lake (Detailed Project Description [Canada Nickel 2022] alternative)	ND4 – Diversion Channel in New Perimeter Valley (east of realigned corridor)
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Disadvantage – footprint of ND1 alternative is the largest, therefore more potential for effects on wildlife and wildlife habitat.	Advantage – footprint of ND2 is smaller than ND1, therefore less potential for effects on wildlife and wildlife habitat.	Disadvantage – footprint of ND3 alternative is longer than ND2 and ND4 therefore more potential for effects on wildlife and wildlife habitat.	Advantage – footprint of ND4 is the smallest, therefore less potential for effects on wildlife and wildlife habitat.
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	Neutral – negligible effects on GHG emissions related to diversion channel construction and operation. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on GHG emissions related to diversion channel construction and operation. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on GHG emissions related to diversion channel construction and operation. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on GHG emissions related to diversion channel construction and operation. Effects can be managed through design and standard mitigation.
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Neutral – no interaction between diversion channel route and health.	Neutral – no interaction between diversion channel route and health.	Neutral – no interaction between diversion channel route and health.	Neutral – no interaction between diversion channel route and health.
Social and Economic Conditions					
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	Neutral – no interaction between diversion channel route and services and infrastructure.	Neutral – no interaction between diversion channel route and services and infrastructure.	Neutral – no interaction between diversion channel route and services and infrastructure.	Neutral – no interaction between diversion channel route and services and infrastructure.
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	Neutral – potential effects on recreation, navigation or commercially based land and resource. Effects can be managed through mitigation, siting or design.	Neutral – potential effects on recreation, navigation or commercially based land and resource. Effects can be managed through mitigation, siting or design.	Neutral – potential effects on recreation, navigation or commercially based land and resource. Effects can be managed through mitigation, siting or design.	Neutral – potential effects on recreation, navigation or commercially based land and resource. Effects can be managed through mitigation, siting or design.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Neutral – potential effects on archaeological resources similar for all alternatives.	Neutral – potential effects on archaeological resources similar for all alternatives.	Neutral – potential effects on archaeological resources similar for all alternatives.	Neutral – potential effects on archaeological resources similar for all alternatives.
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Neutral – no interaction between diversion channel route and economic conditions.	Neutral – no interaction between diversion channel route and economic conditions.	Neutral – no interaction between diversion channel route and economic conditions.	Neutral – no interaction between diversion channel route and economic conditions.
Indigenous Peoples					
Indigenous Interests	<ul style="list-style-type: none"> Change to Indigenous and treaty rights (includes Indigenous land and resources use) Change in physical and cultural heritage Change to governance, health, social and economic conditions of Indigenous nations 	Neutral – potential effects on heritage resources and current use of lands and resources for traditional purposes (including harvesting sites, heritage and other cultural sites, and associated traditional activities) related to diversion channel construction and operation. Effects can be managed through mitigation, siting or design	Neutral – potential effects on heritage resources and current use of lands and resources for traditional purposes (including harvesting sites, heritage and other cultural sites, and associated traditional activities) related to diversion channel construction and operation. Effects can be managed through mitigation, siting or design	Neutral – potential effects on heritage resources and current use of lands and resources for traditional purposes (including harvesting sites, heritage and other cultural sites, and associated traditional activities) related to diversion channel construction and operation. Effects can be managed through mitigation, siting or design	Neutral – potential effects on heritage resources and current use of lands and resources for traditional purposes (including harvesting sites, heritage and other cultural sites, and associated traditional activities) related to diversion channel construction and operation. Effects can be managed through mitigation, siting or design

VC/Criteria	Indicator	ND1 – Diversion Channel in Existing Watercourse Valley	ND2 – Diversion Channel in New Perimeter Valley (west of realigned corridor)	ND3 – Diversion Channel out of Gerry Lake (Detailed Project Description [Canada Nickel 2022] alternative)	ND4 – Diversion Channel in New Perimeter Valley (east of realigned corridor)
Technical / Economic					
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	Disadvantage – alternative alignment is the longest and most expensive alternative.	Advantage – alternative alignment is shorter and less expensive than alternative ND1	Disadvantage – alternative alignment is longer and more expensive than ND2 and ND4.	Advantage – alternative alignment is the shortest and least expensive alternative.
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints 	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program 	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated 	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		NOT PREFERRED – This alternative has several limitations that would ultimately affect the overall ability to implement the Project.	PREFERRED – This alternative has advantages in terms of lower potential effects on surface water, vegetation communities and wetland environments, fish and fish habitat, birds and bird habitats, wildlife and wildlife habitat. The advantage of this alternative is that it would be located further from mining infrastructure but would affect a longer reach of the North Driftwood, albeit less than Alternative ND1.	NOT PREFERRED – This alternative has several limitations that would ultimately affect the overall ability to implement the Project.	PREFERRED – This alternative has advantages in terms of lower potential effects on surface water, vegetation communities and wetland environments, fish and fish habitat, birds and bird habitats, wildlife and wildlife habitat. The advantage of this alternative is that a smaller reach of the North Driftwood would be impacted relative to ND2; however, it would be located closer to mining infrastructure.

Based on the results of the alternatives assessment, both alternatives ND2 and ND4 were selected as potential preferred alternatives because these alternatives have advantages in terms of lower potential effects on surface water, vegetation communities and wetland environments, fish and fish habitat, birds and bird habitats, wildlife and wildlife habitat (i.e., shorter length and smaller footprint, does not directly affect a watercourse).

Alternatives ND1 and ND3, as the two longest alternatives considered, were not selected because both alternatives would be substantially more costly during construction and result in a greater footprint impact. Further, alternative ND1 would result in the greatest impact to the North Driftwood River requiring the longest abandonment of the existing watercourse and its fish habitat. As a result, alternatives ND1 and ND3 could potentially result in greater effects to surface water, vegetation communities and wetland environments, fish and fish habitat, birds and bird habitats, wildlife and wildlife habitat. In addition, alternative ND1 would require a cut along nearly the entire length of the unnamed tributary of the North Driftwood River. Based on the required amount of cut, a full new valley would be required in the location of the existing watercourse to convey the diversion flows. This new valley would directly affect the existing watercourse and its associated, habitat requiring greater Project offsetting under the *Fisheries Act*. Additionally, the channel is longer and farther away from the main components of the Project site, which would render construction, including transportation of cut material more complex and costly.

5.3.8 Mining-Related Activities

5.3.8.1 Mining Operations

Step 1 - Initial Screening

When it comes to mining operations, selecting the most suitable method is crucial for efficient and safe resource extraction.

Two candidate alternatives were considered:

- Open Pit
- Block cave/underground

The block cave alternative was screened out given that the costs associated with this alternative (up to 3 times more expensive than the Open Pit alternative) make it economically not feasible. Therefore, the initial screening identified that the only feasible alternative for mining operations was open pit. As a result of the initial screening, a comparative analysis was not required.

5.3.8.2 Ore Process Plant Location

Step 1 - Initial Screening

Ore extracted from the Open Pit will need to be hauled from the Open Pit to an ore Stockpile, crushed to a size and consistency that can be processed by the Process Plant, and stored until it is ready to be transferred to the Process Plant.

For open pit mining, siting of the Process Plant is dependent on the location and extent of the Open Pit with the plant site required to be in proximity to the mining area (Open Pit) to reduce haul distances for economic viability and to limit the corresponding environmental effects related to extended haul routes including dust, emissions, and overall Project footprint.

Two candidate alternatives were considered:

- East of relocated Highway 655
- West of relocated Highway 655

Alternative locations east and west of Highway 655 were considered in the initial screening. The eastern location, situated on an esker, offers enhanced geotechnical stability due to the naturally compacted glacial deposits, which can provide a solid foundation for construction. The western location lacks the inherent geotechnical stability provided by an esker, making this alternative not feasible. As such, the initial screening identified only one feasible alternative for the Process Plant location, and as a result, a comparative analysis was not required.

In addition, processing off-site would be inefficient and uneconomical, and therefore, this alternative does not meet the needs of the Project. Having the Process Plant located on-site provides the greatest technical/economic efficiency and reduces environmental effects of ore handling by reducing transport requirements and reducing the Project footprint.

5.3.8.3 Ore Process Plant Design

Step 1 - Initial Screening

Design and technology alternatives are constrained, since equipment must be selected that will meet the operational needs of the mine, and industry standard technologies have limited variation in the potential for environmental effects. As a result, the ore processing methods are controlled by laboratory testing and analyses to obtain optimal recovery using full scale proven technologies and it is not technically feasible to use other methods. The initial screening identified only one feasible alternative for Process Plant design. As a result, a comparative analysis was not required.

5.3.9 Mine Waste Management

5.3.9.1 Impoundment Facility

Four candidate location alternatives were considered:

- MWM-1 – This alternative refers to the Impoundment Facility located north of the Open Pit.
- MWM-2 – This alternative consists of the storage area located south of the Open Pit and a fraction of storage facility north of the Open Pit.
- MWM-3 – This alternative consists of the storage area located west of realigned Highway 655 and the same area north of the Open Pit as described in MWM-2.
- MWM-4 – This alternative refers to an area to the east of West Buskegau river.

As discussed in Section 5.2.1.4, the alternatives assessment followed the Environment and Climate Change Canada's Guidelines for the Assessment of Alternatives for Mine Waste Disposal (ECCC 2013) and alternative MWM-1 (located north of the Open Pit) was selected as the preferred alternative. For details, see Appendix G (Multiple Accounts Analysis).

5.3.9.2 Tailings Management Facility

Six candidate location alternatives were considered:

- South of Open Pit with In-Pit Disposal
- North of Open pit with In-Pit Disposal
- South of Open Pit (All Above Ground Disposal)
- North of Open Pit (All Above Ground Disposal)
- North and South of Open Pit (All Above Ground Disposal)
- East of the West Buskegau River with In-Pit Disposal

As discussed in Section 5.2.1.4, the alternatives assessment followed the Environment and Climate Change Canada's Guidelines for the Assessment of Alternatives for Mine Waste Disposal (ECCC 2013) and the alternative South of Open Pit with In-Pit Disposal was selected as the preferred alternative. For details, see Appendix G (Multiple Accounts Analysis).

5.3.9.3 Tailings Management Techniques to Improve Carbon Sequestration

Step 1 - Initial Screening

The tailings and waste rock produced by the Project spontaneously and permanently capture CO₂ when exposed to the atmosphere. Canada Nickel is proposing processes anticipated to optimize the carbon capture potential of the Project, which will help to offset Project emissions.

Candidate alternatives for carbonation include:

- Passive mineral carbonation: this alternative involves natural carbon capture and storage of atmospheric CO₂.
- Active mineral carbonation (In-Process Tailings [IPT] Carbonation): this alternative involves carbon storage of industrially sourced CO₂.

While CO₂ naturally reacts with the brucite contained in tailings (i.e., passive carbonation), Canada Nickel plans to implement a novel IPT Carbonation process capable of harnessing the natural mineral sequestration capabilities of host rock to actively capture a concentrated source of CO₂. In this active carbonation process, tailings generated by the milling process are conditioned with a concentrated source of CO₂ after tailings thickening and before discharge to the TMF. CO₂ delivered to the site is sparged into the tailings slurry in a controlled manner to increase CO₂ exposure to mineral surfaces and promote faster and more complete mineralization reactions.

The only VC/criterion applicable for these alternatives is Climate Change. As such, a comparative table is not presented here, rather, a discussion about potential changes in climate change indicators.

As mentioned above, atmospheric CO₂ reacts with brucite found in the tailings, resulting in passive carbonation. Active mineral carbonation represents a carbon sink (i.e., gained carbon sequestration potential). Based on preliminary pilot scale testing, the IPT Carbonation process is estimated to have a maximum CO₂ storage capacity approximately 8 to 12 times relative to the rate of passive carbonation (Canada Nickel 2022), representing a substantial advantage over passive carbonation. As a result, while passive carbonation is technical feasible, Canada Nickel is proposing to supplement the storage of CO₂ through the addition of active carbonation to the process. As mentioned above, passive carbonation will occur whether active carbonation is implemented or not. Canada Nickel selected active mineral carbonation to further increase carbon sequestration and is working towards developing the Project as a potentially carbon negative mining operation by implementing In-Process Tailings (IPT) Carbonation.

5.3.10 Water and Wastewater Management

5.3.10.1 Domestic Sewage Waste

Step 1 - Initial Screening

Domestic sewage waste will be limited and will be generated from office and administrative buildings, as well as the mine dry. During the construction and operations of the Project, domestic sewage will be treated to meet regulatory requirements and either directed to a pond on site or discharged into the environment.

Three candidate alternatives were considered:

- On-site sewage treatment plant: This alternative involves a compact, self-contained system designed to treat domestic wastewater generated by the Project. This system typically includes primary, secondary, and sometimes tertiary treatment processes to remove contaminants and produce effluent that meets environmental standards. The treated water can then be safely discharged into the environment or reused for non-potable purposes
- On-site septic systems: This alternative includes underground chambers where domestic sewage from the Project is collected and partially treated. The solids settle at the bottom of the tank, while the liquid effluent flows into either a drain field for further natural filtration and absorption into the soil, or based on the predominant clay layer and shallow water table, into a secondary and potentially tertiary treatment
- Sewage lagoons: This alternative includes large, shallow ponds designed to treat domestic wastewater through natural biological processes. Wastewater from the Project is stored in these lagoons, where sunlight, algae, and microorganisms break down organic matter over time

Sewage lagoons are not technically feasible because this alternative would not provide adequate sewage treatment capacity and because lagoons require larger areas of land, further increasing the Project footprint. In addition, sewage lagoons may produce odors, which need to be managed to reduce environmental and community effects.

The other two alternatives are considered technically and economically feasible based on financial costs (i.e., costs are acceptable for Project implementation), constructability (i.e., no unnecessary design constraints identified), proven technology (i.e., alternatives to follow industry standards) and safety (i.e., alternatives can be safely constructed and operated). Therefore, these two alternatives were carried forward to the comparative analysis step.

Step 2 - Examination of Potential Effects on Valued Components

Sewage treatment plants remove contaminants from wastewater. Treated wastewater can be safely discharged back into rivers and lakes. Treatment plants require energy for processes such as pumping, aeration, and disinfection. Some treatment processes involve chemicals that need proper handling and disposal. On-site treatment plants can be highly effective in reducing pollutants and can be tailored to handle varying wastewater volumes, making them suitable for remote mining locations.

Septic systems use natural processes to break down waste, but if not properly maintained, septic systems can potentially contaminate groundwater with untreated wastewater. In addition, storms and flooding can overwhelm septic systems, leading to malfunction. Septic systems are relatively simple and cost-effective, requiring minimal maintenance. However, while technically feasible, they are best suited for smaller-scale operations and areas with suitable soil conditions for effective drainage and filtration.

Step 3 – Comparative Analysis

Table 5.10 provides the comparative analysis between the three ‘alternative means’ that were considered feasible.

Table 5.10 Domestic Sewage Waste Comparative Analysis

VC/Criteria	Indicator	On-site Sewage Treatment Plant	On-site Septic Tanks
Natural Environment			
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Advantage – no interaction between sewage treatment plant alternative and terrain stability.	Disadvantage – Effects on terrain stability from septic tank alternative greater than treatment plant, but effects can be managed through design and applicable standards.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Advantage – no interaction between sewage treatment plant alternative and soil quality and quantity.	Disadvantage – minimal effects on soil quality and quantity from septic tank alternative. Effects can be managed through design and standard mitigation.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Neutral – negligible effects on air emissions related to sewage treatment plant. Odor emissions are possible but localized.	Neutral - negligible effects on air emissions related to septic tanks. Odor emissions are possible but localized.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral – no interaction between sewage treatment plant alternative and ambient light.	Neutral – no interaction between septic tank alternative and ambient light.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral – negligible effects on noise/vibration related to sewage treatment plant operation. Effects can be managed through mitigation, siting or design.	Neutral – no effects on noise/vibration related to septic tank operation anticipated.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Advantage – negligible effects on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Disadvantage – negligible effects on groundwater quality and quantity associated with alternative. Risk of untreated wastewater contaminating groundwater if not maintained properly. Effects can be managed through design and standard mitigation.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Advantage – negligible effects on surface water quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Disadvantage – negligible effects on surface water quality and quantity associated with alternative. Risk of contamination if not managed well. Effects can be managed through design and standard mitigation.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Neutral – no interaction between sewage treatment plant alternative and vegetation.	Neutral – no interaction between septic tank alternative and vegetation.
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Disadvantage – limited potential for effects related to water quality, but regulatory requirements can be met and effects can be managed through siting or design.	Advantage – potential effects can be managed through proper siting and design of septic system.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Neutral – no interaction between sewage treatment plant alternative and birds and bird habitats.	Neutral – no interaction between septic tank alternative and birds and bird habitats.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Neutral – no interaction between sewage treatment plant alternative and wildlife and wildlife habitat.	Neutral – no interaction between septic tank alternative and wildlife and wildlife habitat.
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	Disadvantage - limited effects on GHG emissions related to sewage treatment plant operation due to energy consumption.	Advantage – no interaction between septic tank alternative and climate change.
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Neutral – no interaction between sewage treatment plant alternative and health.	Neutral – no interaction between septic tank alternative and health.

VC/Criteria	Indicator	On-site Sewage Treatment Plant	On-site Septic Tanks
Social and Economic Conditions			
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	Neutral potential effects on services and infrastructure, since biosolids would need to be shipped using specialized contractors.	Neutral – potential effects on services and infrastructure through temporary storage and offsite treatment / disposal of sewage at licensed facility, requiring adequate capacity in receiving community treatment facilities
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	Neutral – no interaction between sewage treatment plant alternative and land and resource use, since alternative would be located within the PA.	Neutral – no interaction between septic tank alternative and land and resource use, since alternative would be located within the PA.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Neutral – potential effects on archaeological resources similar for both alternatives.	Neutral – potential effects on archaeological resources similar for both alternatives.
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Neutral – no interaction between sewage treatment plant alternative and economic conditions.	Neutral – no interaction between septic tank alternative and economic conditions.
Indigenous Peoples			
Indigenous Interests	<ul style="list-style-type: none"> Change to Indigenous and treaty rights (includes Indigenous land and resources use) Change in physical and cultural heritage Change to governance, health, social and economic conditions of Indigenous nations 	Neutral – potential effects on heritage resources and Indigenous land and resource use related to sewage treatment plant operation similar for both alternatives.	Neutral – potential effects on heritage resources and Indigenous land and resource use related to septic tank operation similar for both alternatives.
Technical / Economic			
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	Disadvantage - Higher initial and operational costs.	Advantage - Lower initial costs but may have higher long-term maintenance costs.
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints 	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program 	Advantage – alternative would use proven technology and can handle larger volumes and meet stringent effluent quality standards.	Disadvantage – alternative would use proven technology and though only be suitable for smaller volumes.
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated 	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		PREFERRED – This alternative has advantages in terms of lower potential effects on terrain stability, soil quantity and quality, groundwater, surface water, fish and fish habitat, and health. However, has higher initial and operational costs.	PREFERRED – This alternative has disadvantages in terms of potential effects on terrain stability, soil quantity and quality, groundwater, surface water, fish and fish habitat, and health. However, it has lower costs.

Based on the results of the alternatives assessment, both alternatives reveal distinct advantages and disadvantages. The sewage treatment plant alternative offers advantages in terms of lower potential effects on terrain stability, soil quantity and quality, groundwater, surface water, fish and fish habitat, and health. However, these advantages come with higher initial and operational costs. Conversely, the septic system alternative, while more cost-effective in terms of initial and operational expenses, presents disadvantages concerning terrain stability, soil quantity and quality, groundwater, surface water, fish and fish habitat, and health, with this option only feasible where ground conditions permit. At the current stage of Project development, both alternatives remain viable options. As the Project progresses, a final determination will be made based on further analysis and evolving Project requirements.

5.3.10.2 Water Treatment Technology

Step 1 - Initial Screening

Contact water that will accumulate in the Open Pit due to groundwater inflow, direct precipitation, and runoff and contact water (which includes precipitation, groundwater, or surface water that comes in contact with Project components) will need to be managed throughout the life of the mine. Standard industry practice typically involves collecting contact water in a series of ditches and sumps, and pumping (if required) it to collection ponds to remove suspended solids prior to discharge.

The design of the contact water collection ponds will be confirmed during detailed design with additional geotechnical testing in the area being completed along with refining operating requirements and water levels for the pond. Based on actual site conditions, the need for a liner to maintain pond volumes and to address potential seepage is not expected to be required, given the presence of clay. The screening focused on design/technology alternatives, since the location of the components is dependent on the site infrastructure configuration and topography.

Three candidate alternatives were considered:

- Water treatment plant(s): This alternative includes water treatment plants being used before water is discharged to the environment
- Collection ponds: This alternative involves using collection ponds designed as settling ponds to aid in removing total suspended solids (TSS) before water is discharged to the environment
- No treatment: This alternative involves not treating contact water before discharging to the environment

The no treatment alternative is not technically feasible since contact water would not meet regulatory requirements before being discharged to the environment. Both the modular treatment plant and collection ponds alternatives are considered technically and economically feasible based on financial costs (i.e., costs are not prohibitive for Project implementation), constructability (i.e., no unnecessary design constraints identified), proven technology (i.e., alternatives to follow industry standards) and safety (i.e., alternatives can be safely constructed and operated). Therefore, both alternatives were carried forward to the comparative analysis step.

Step 2 - Examination of Potential Effects on Valued Components

Water treatment plays a crucial role in the mining industry, contributing to the sustainable and responsible extraction of valuable resources. Untreated water from mining operations can release heavy metals and other harmful contaminants into the environment. These pollutants can enter water bodies, affecting aquatic life and potentially spreading through the food chain. In addition, high sediment loads in mining wastewater can also affect aquatic habitats.

Step 3 – Comparative analysis

Table 5.11 provides the comparative analysis between the alternative means that were considered feasible.

Table 5.11 Water Treatment Technology Comparative Analysis

VC/Criteria	Indicator	Water Treatment Plant	Collection Ponds
Natural Environment			
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral - negligible effects on terrain stability from modular treatment plant siting. Effects can be managed to applicable standards through in-design mitigation.	Neutral - negligible effects on terrain stability from collection ponds. Effects can be managed to applicable standards through in-design mitigation.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Neutral – negligible effects on soil quality and quantity from modular treatment plant siting. Effects can be managed to applicable standards through in-design mitigation.	Neutral – negligible effects on soil quality and quantity from collection ponds. Effects can be managed to applicable standards through in-design mitigation.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Neutral – no interaction between water treatment technology and ambient air quality.	Neutral – no interaction between water treatment technology and ambient air quality.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral – no interaction between water treatment technology and ambient light.	Neutral – no interaction between water treatment technology and ambient light.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral – no interaction between water treatment technology and acoustic environment.	Neutral – no interaction between water treatment technology and acoustic environment.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Neutral – negligible effects on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on groundwater quality and quantity associated with alternative. Effects can be managed through design and standard mitigation.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Advantage – greater treatment potential through modular treatment plants that can be tailored to treat effluent from the mine before discharging to the environment.	Disadvantage – while capable of treating for some parameters (i.e., TSS), treatment ponds are unable to treat for all required parameters prior to discharge to the environment.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Neutral – negligible effects on vegetation communities due to small footprint.	Neutral – while larger footprint, negligible effects on vegetation communities since ponds are required to manage contact water and supply water for ore processing.

VC/Criteria	Indicator	Water Treatment Plant	Collection Ponds
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Advantage – greater treatment potential through modular treatment plants that can be tailored to treat effluent from the mine, thereby further protecting fish and fish habitat.	Disadvantage – while capable of treating for some parameters (i.e., TSS), treatment ponds are unable to treat for all required parameters prior to discharge to watercourses containing fish and fish habitat.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Neutral – negligible effects on birds and bird habitats communities due to small footprint.	Neutral – while larger footprint, negligible effects on birds and bird habitats since ponds are required to manage contact water and supply water for ore processing.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Neutral – negligible effects on wildlife and wildlife habitat communities due to small footprint.	Neutral – while larger footprint, negligible effects on wildlife and wildlife habitat since ponds are required to manage contact water and supply water for ore processing.
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	Neutral – no interaction between water treatment technology and climate change.	Neutral – no interaction between water treatment technology and climate change.
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Neutral – no interaction between water treatment technology and health conditions.	Neutral – no interaction between water treatment technology and health conditions.

VC/Criteria	Indicator	Water Treatment Plant	Collection Ponds
Social and Economic Conditions			
Services and Infrastructure	<ul style="list-style-type: none"> • Change in demand for services and infrastructure • Change in accommodation availability • Change in demand for transportation infrastructure 	Neutral – no interaction between water treatment technology and services and infrastructure.	Neutral – no interaction between water treatment technology and services and infrastructure.
Land and Resource Use	<ul style="list-style-type: none"> • Change in land use designations and private property • Change in recreation • Change in resource use 	Neutral – no interaction between water treatment technology and land and resource use.	Neutral – no interaction between water treatment technology and land and resource use.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> • Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Advantage – negligible effect on archaeological resources due to small footprint	Disadvantage – potential effects on archaeological resources due to larger footprint
Economic Conditions	<ul style="list-style-type: none"> • Change in employment • Change in business • Change in provincial economy 	Neutral – no interaction between water treatment technology and economic conditions.	Neutral – no interaction between water treatment technology and economic conditions.

VC/Criteria	Indicator	Water Treatment Plant	Collection Ponds
Indigenous Peoples			
Indigenous Interests	<ul style="list-style-type: none"> • Change to Indigenous and treaty rights (includes Indigenous land and resources use) • Change in physical and cultural heritage • Change to governance, health, social and economic conditions of Indigenous nations 	Advantage – limited effects on Indigenous interests as a result of selected water treatment technology with smaller footprint.	Disadvantage – potential effects on heritage resources may affect Indigenous interests as a result of selected water treatment technology.
Technical / Economic			
Financial Costs	<ul style="list-style-type: none"> • Alternative does not result in prohibitively high capital costs and operating costs 	Disadvantage – increased cost associated with the construction (procurement) and operation of each modular treatment plant.	Advantage – no incremental cost for water treatment since ponds are required to manage contact water and supply water for ore processing.
Constructability	<ul style="list-style-type: none"> • Alternative is constructable while avoiding undue or unnecessary design constraints 	Neutral – alternative can be constructed/procured using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.
Proven Technology	<ul style="list-style-type: none"> • Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program 	Advantage – alternative would use proven technology and follow applicable design standards targeting specific parameters.	Disadvantage – alternative would use proven technology and follow applicable design standards; however, while capable of treating for some parameters (i.e., TSS), treatment ponds are unable to provide treatment for all required parameters prior to discharge.

VC/Criteria	Indicator	Water Treatment Plant	Collection Ponds
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated 	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		PREFERRED – Water treatment plants can provide treatment for more parameters in order to meet regulatory requirements for discharge to the environment.	PREFERRED – Collection ponds designed as settling ponds will remove TSS and can supply reclaimed water for ore processing but may not meet regulatory requirements for discharge to the environment.

Based on the results of the alternatives assessment, a combination of water treatment plant and collection ponds was selected as the preferred alternative, because collection ponds alone (which are more economical) may not be able to meet regulatory requirements for discharges to the environment.

The collection ponds will be designed as settling ponds with a permanent water depth to aid in removing TSS prior to supplying water for ore processing or discharging to the receiving environment. Each pond will be equipped with a water treatment plant so that discharge meets environmental criteria.

5.3.10.3 Effluent Discharge – Operations

During early construction, run off from the construction sites and other disturbed areas will be dispersed following natural drainage pathways until such time as water management infrastructure is in place. This will be managed using industry standard erosion and sediment control measures. Below, discharge points when the water management infrastructure is in place are discussed.

Step 1 – Initial Screening

During operation, excess water from the mine will be treated and discharged to the environment. Whether such water would be discharged to a single location or whether such water would be distributed to multiple locations / watersheds was considered in the development of the water management plan.

The overall approach to water management discharge locations considered the following candidate alternatives:

- Single discharge location: discharge to the Mattagami River via a pipeline (i.e., as proposed in the Detailed Project Description [Canada Nickel 2022])
- Distributed (multiple) discharge locations: discharge to the North Driftwood River and West Buskegau River watersheds

Both alternatives were considered technically and economically feasible based on financial costs, constructability, proven technology, and safety. Therefore, both alternatives were carried forward to the comparative analysis step.

Step 2 - Examination of Potential Effects on Valued Components

Excess water from mining operations, including runoff captured from mining areas (i.e., TMF, Impoundment Facility, Stockpiles, dewatering of the Open Pit) will be treated prior to discharge. Changes in topography and catchment areas resulting from mine development will alter the existing water balance and contribution of flows to receiving waterbodies. Discharging excess water to a single location with greater flow to accommodate this discharge, such as the Mattagami River, allows for benefits from the higher assimilative capacity of this larger receiver; however, distributing flows to multiple watersheds increases the ability to better match existing flow contributions (i.e., water balance) to support flows in downstream watercourses.

Step 3 - Comparative Analysis

Table 5.12 provides the comparative analysis between the three 'alternative means' that were considered feasible.

Table 5.12 Discharge Points Comparative Analysis (During Operations)

VC/Criteria	Indicator	Single Discharge Location	Distributed Discharge
Natural Environment			
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral – negligible effects on terrain stability from this alternative. Effects can be managed through design and standard mitigation.	Neutral - negligible effects on terrain stability from this alternative. Effects can be managed through design and standard mitigation.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Disadvantage – increased effects on soil due to footprint of construction of the pipeline to the Mattagami River.	Advantage – reduced effects on soil due to smaller footprint and clearing associated with multiple localized discharges to adjacent watercourses.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Neutral – no interaction between the atmospheric environment and number of discharge locations.	Neutral – no interaction between the atmospheric environment and number of discharge locations.
	<ul style="list-style-type: none"> Change in ambient light 	Neutral – no interaction between ambient light and number of discharge locations.	Neutral – no interaction between ambient light and number of discharge locations.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral – no interaction between the atmospheric environment and number of discharge locations.	Neutral – no interaction between the atmospheric environment and number of discharge locations.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Neutral – negligible effects on groundwater from this alternative. Effects can be managed through mitigation, siting or design.	Neutral – negligible effects on groundwater from this alternative. Effects can be managed through mitigation, siting or design.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Disadvantage – discharging to the Mattagami River would substantially reduce flows in the upper reaches of the North Driftwood River and West Buskegau River, although would result in increased dilution and a smaller mixing zone since mine contributions would be a smaller component of existing flows in the Mattagami River. Effects on water quality can be managed through mitigation, siting or design.	Advantage – distributing discharge to multiple locations (i.e., North Driftwood River and West Buskegau River watersheds) increases ability to better match existing water balance to reduce effects from the loss of flows to downstream watercourses; however, since these watercourses have less flow than the Mattagami River, discharging to these watercourses would result in decreased dilution potential and a larger mixing zone. Effects on water quality can be managed through mitigation, siting or design.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Disadvantage – increased effects on vegetation communities due to footprint of construction of the pipeline to the Mattagami River.	Advantage – reduced effects on vegetation communities due to smaller footprint and clearing associated with multiple localized discharges to adjacent watercourses.
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Disadvantage – while water quality effects can be managed through appropriate treatment, redirecting all flows to the Mattagami River and away from the North Driftwood River and West Buskegau River may adversely affect fish habitat in these watercourses. In addition, this alternative would have potential effects on Lake Sturgeon in the Mattagami River.	Advantage – while water quality effects can be managed through appropriate treatment, distributing discharge to the North Driftwood River and West Buskegau River reduces the loss of flow (i.e., increased potential for water balance) and therefore may reduce potential adverse effects on fish and fish habitat in these watercourses.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Disadvantage – increased effects on birds and bird habitats due to footprint of construction of the pipeline to the Mattagami River.	Advantage – reduced effects on birds and bird habitats due to smaller footprint and clearing associated with multiple localized discharges to adjacent watercourses.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Disadvantage – increased effects on wildlife and wildlife habitat due to footprint of construction of the pipeline to the Mattagami River.	Advantage – reduced effects on wildlife and wildlife habitat due to smaller footprint and clearing associated with multiple localized discharges to adjacent watercourses.
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	Neutral – no interaction between climate change and number of discharge locations.	Neutral – no interaction between climate change and number of discharge locations.

VC/Criteria	Indicator	Single Discharge Location	Distributed Discharge
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Neutral – no interaction between discharge location and health conditions.	Neutral – no interaction between discharge location and health conditions.
Social and Economic Conditions			
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	Neutral – alternatives would have limited interaction with services and infrastructure because the effluent discharge location(s) would be located within the PA and potential effects can be effectively mitigated through siting or design.	Neutral – alternatives would have limited interaction with services and infrastructure because the effluent discharge location(s) would be located within the PA and potential effects can be effectively mitigated through siting or design.
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	Disadvantage – given the use of the Mattagami River for recreational activities, and corresponding prominence of this feature on the landscape, discharging mine effluent to the Mattagami River could be perceived as an adverse effect by potential users.	Advantage – reduced potential effects on land and resource use by avoiding the Mattagami River, although similar perceived effects may exist for recreational users of the North Driftwood River and West Buskegau River.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Disadvantage – higher potential for effects on archaeological resources due to larger footprint and construction in proximity to Mattagami River, which is a known traditional waterway of various Indigenous nations	Advantage – lower potential for effects on archaeological resources due to smaller footprint
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Neutral – no interaction between discharge locations and economic conditions.	Neutral – no interaction between discharge locations and economic conditions.
Indigenous Peoples			
Indigenous Interests	<ul style="list-style-type: none"> Change to Indigenous and treaty rights (includes Indigenous land and resources use) Change in physical and cultural heritage Change to governance, health, social and economic conditions of Indigenous nations 	Disadvantage – given the recognition by Indigenous communities for the importance and prominence of the Mattagami River, discharging mine effluent to the Mattagami River could be perceived as an adverse effect by Indigenous communities.	Advantage – reduced potential effects on Indigenous land and resource use by avoiding the Mattagami River, although similar perceived effects may exist for recreational users of the North Driftwood River and West Buskegau River.
Technical / Economic			
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	Neutral – increased costs associated with constructing and operating a pipeline to the Mattagami River for the duration of the Project, although only a single treatment plant would be required (lower water treatment costs)	Neutral – reduced costs associated with distributed discharge locations, which rely on natural drainage to nearby watercourses rather than a pipeline(s), although multiple treatment plants would be required (higher water treatment costs)
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints 	Neutral – alternative can be constructed using conventional construction methods, although constructing a pipeline requires greater design and effort than drainage channels for distributed discharge.	Neutral – alternative can be constructed using conventional construction methods, with the construction of multiple discharge channels requiring less design and effort than for a pipeline.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program 	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated 	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		NOT PREFERRED – This alternative is not preferred due to the increased costs and adverse effects on soil, surface water, fish habitat and perceived effects by land users.	PREFERRED – This alternative is preferred due to the reduced cost and ability to better match the existing water balance and reduce potential effects on soil, surface water and fish habitat.

Based on the results of the comparative analysis, the distributed discharge alternative was selected as the preferred alternative, which as noted in Chapter 3 (Project Description) of the Impact Statement, is a major revision to the Project design since the filing of the Detailed Project Description (Canada Nickel 2022). This alternative allows for mine water balance and discharge operations to better mimic existing drainage patterns, avoids potential or perceived impacts to water quality and use of the Mattagami River given its social and cultural importance, and could potentially reduce capital and operational costs associated with the Project. This alternative also facilitates a more efficient Project design that reduces the expansion of Project infrastructure to the west of the realignment Highway 655 and into a waterway known and recognized as a traditional waterway of various Indigenous nations.

5.3.11 Waste Management

5.3.11.1 Domestic and Industrial Waste

Step 1 - Initial Screening

Non-hazardous waste materials will be generated during all phases of the Project and will be disposed of in accordance with provincial regulations. Domestic and industrial wastes may include food waste, clothing, scrap metal, glass, plastic, and fibrous material (e.g., wood and paper).

Two candidate alternatives were considered:

- Disposal within an existing licensed facility
- Disposal within a new licensed facility

The preferred alternative to manage non-hazardous waste is to temporarily store it onsite and regularly transport it by trucks to an offsite existing licensed facility. This has the advantage of transferring the responsibility for final management of the waste to a separate operator within a facility already designed to manage the potential effects. This alternative will also reduce the environmental issues that need to be managed onsite, such as leachate management and odour control. The primary disadvantages of this alternative include costs for transport and tipping fees, increased traffic along local roads, and the resulting emissions.

Although a new landfill dedicated to the Project could be established at a separate site to manage the waste, the disadvantages of this option include increased capital costs, and higher operational complexity and costs associated with safely managing a landfill to provide worker safety and control environmental effects. Establishing a new landfill site would result in the need to manage environmental effects, such as vegetation clearing, wildlife disruption, and groundwater and surface water contamination. This would also result in increased nuisance effects related to traffic, noise and odour.

The initial screening identified that the only feasible alternative for non-hazardous waste management was trucking wastes to an offsite licensed facility. As a result of the initial screening, a comparative analysis was not required.

5.3.11.2 Hazardous Waste

Step 1 - Initial Screening

Hazardous waste will include vehicle maintenance wastes (waste petroleum products, waste glycol and packaging), petroleum contaminated soil (in case of a spill), waste explosives, and biomedical waste.

Only one candidate alternative was considered:

- Transportation to a licensed facility off-site

Hazardous wastes produced in the construction, operations, decommissioning, and closure phases of the Project will be stored indoors and/or in sealed containers in an area with secondary containment until they can be appropriately transported to a licensed facility off site.

The initial screening identified that the only feasible alternative for hazardous waste management was trucking wastes to an offsite licensed facility. As a result of the initial screening, a comparative analysis was not required.

5.3.12 Decommissioning and Closure

Step 1 - Initial Screening

The requirements of a closure plan and of closing out a mining project are set out in the Ontario *Mining Act, R.S.O. 1990, c. M.14* and the Mine Rehabilitation Code of Ontario, as set out in Ontario Regulation 35/24 (O. Reg.). As a requirement of O. Reg. 35/24, the Mine Development Closure Plan will discuss rehabilitation activities that are to be implemented.

For the purposes of the Impact Statement, a Conceptual Closure Plan (Appendix F) has been prepared. It is not intended to meet all requirements for a Closure Plan under O. Reg. 35/24. However, it provides preliminary details on the progressive rehabilitation and closure plans for the Project to demonstrate Canada Nickel's commitment to responsible Project development and planning with closure in mind at the Impact Assessment stage of Project development. In general, the closure activities will be conducted in accordance with regulations that exist at the time of closure.

The primary objectives of rehabilitation and closure activities are to establish a PA that has:

- been stabilized physically, chemically, and biologically, for both the terrestrial and aquatic landscape
- re-established surface drainage
- discharge water that meets effluent surface water and groundwater quality criteria (specific discharge locations will be determined in accordance with O. Reg. 35/24)
- rehabilitated areas of ground disturbance, where practical
- self-sustaining vegetative cover, where practical, on reclaimed areas

Rehabilitation can take place during different stages of the mining project throughout the life of the mine.

Based on this, two candidate alternatives were considered:

- closure rehabilitation
- progressive rehabilitation

Closure rehabilitation involves activities that are completed after mining operation ceases, to restore and/or reclaim the Project to as close to its pre-mining condition. Such activities include demolition and removal of site infrastructure, revegetation of disturbed areas, and other activities to achieve the requirements and goals as detailed in the Project's Closure Plan. Progressive rehabilitation involves activities that are completed throughout the mine operation, prior to closure, wherever practical to do so. This includes activities that contribute to the overall rehabilitation effort and would otherwise be carried out as part of the closure rehabilitation at the end of mining life. Some examples of progressive rehabilitation activities include:

- Removal of construction-related buildings and rehabilitation of laydown areas and access roads used during construction
- Progressive reclamation of the Impoundment Facility
- Rehabilitation of the TMF upon completion of deposition after Year 17 of operations
- Conducting vegetation rehabilitation test plot studies

Revegetation will occur as soon as practical after Project components are no longer actively used. Details of the seed mixture, mulching, and fertilization requirements will be established through the progressive rehabilitation test plotting program. The test plotting will also be used for test planting prescriptions of local conifers. Fertilizer and irrigation needs, and the influence of slope, aspect and soil moisture on the survival rates of planted seedlings will be evaluated further in the Mine Development Closure Plan.

Both final closure rehabilitation and progressive rehabilitation are considered required for the Project and no other alternatives are available. Therefore, a comparative analysis was not required.

5.3.13 Workforce Hiring, Scheduling and Accommodation Strategies

5.3.13.1 Workforce Hiring

Open hiring is a strategy that emphasizes equal opportunity for all applicants. This approach is based on the principle that every individual, regardless of their background, deserves a fair chance to prove their capabilities. Open hiring can lead to a diverse workforce, bringing together individuals with different skills, experiences, and perspectives.

Prioritizing certain groups is a hiring strategy that involves giving preference for specific groups, such as local communities, Indigenous people, or those who are typically under-represented in the industry, to create a diverse work force. Hiring from local communities can improve relations and foster a sense of ownership and inclusion, and it can contribute to social and economic development of the local communities.

Open hiring may not directly impact the environment. However, if employees are hired from distant locations, it could increase carbon emissions due to commuting or relocation. This approach promotes social equality by giving everyone an equal opportunity, fostering a sense of fairness in the community. By bringing together individuals from diverse backgrounds, open hiring can enrich the workplace culture.

Hiring local community members or Indigenous peoples can potentially lead to better environmental practices, as these groups often have a deep understanding and respect for the local environment. This strategy can enhance social cohesion by prioritizing underrepresented groups. Prioritizing certain groups can contribute to local economic development. However, the pool of applicants might be limited, potentially leading to a compromise on the skill requirements, and there could be a perception of bias or unfairness among those who are not part of the prioritized groups. This approach can also help preserve and respect local and Indigenous culture. It can also contribute to a diverse and inclusive workplace culture.

Canada Nickel is committed to various hiring practices, including hiring first from local communities and the region. As a result, a comparative analysis was not completed. Hiring practices have been developed to encourage employment of Indigenous peoples, local youth, women, and under-represented populations. Though Canada Nickel wishes to hire primarily from local and Indigenous nations, workers from outside of the region may be required to meet the workforce demand of the Project. Canada Nickel will aim to increase the percentage of the local workforce and reduce the requirement to hire workers from outside the region by providing training opportunities to local residents. Canada Nickel is working with NORCAT (formerly known as the "Northern Centre for Advanced Technology") to develop courses that will be administered by Northern College, which will include apprenticeship programs as well as specialized training for vehicle operation. This program will be run multiple times to provide an opportunity to equip locals with the skills needed to work on the Project.

5.3.13.2 Scheduling

Step 1 - Initial Screening

Mine operations will be 24-hours per day, 365 days per year. In the context of mining operations, efficient scheduling plays a pivotal role in optimizing productivity, and maintaining continuous production.

Two candidate alternatives were considered:

- three 8-hr shifts
- two 12-hr shifts

Selecting the optimal scheduling alternative depends on the specific needs of the mining project, workforce availability, and business goals.

Beyond a marginal increase in traffic and corresponding emissions as a result of Project activities, effects of these two alternatives on VCs are limited. Twelve-hour shifts are common in the mining industry and is often preferred by workers who seek to increase their earnings during their shifts. In addition, the ability for Canada Nickel to attract workers requires offering competitive opportunities for gainful employment.

The 12-hour shift schedule can be a strong incentive for workers seeking higher income potential and longer periods of rest between work cycles. Furthermore, from an operational efficiency perspective, three 8-hour shifts require more complex coordination and management, while fewer shift changes can lead to increased operational efficiency and reduced downtime. This can be particularly advantageous in maintaining continuous operations and meeting production targets.

The 12-hour shifts alternative was selected as the preferred alternative; however, Canada Nickel will determine the appropriate schedule that balances human resources and economic prosperity. Therefore, a comparative analysis was not completed.

5.3.13.3 Accommodations

Step 1 - Initial Screening

During construction, which will last approximately three years, the workforce will reach a maximum of nearly 2,000 workers during the peak construction period. Project operations will directly employ an average of 1,250 workers during phase 1 (Year 1-5), 850 people per year during phase 2 (Year 5-30) and 300 during phase 3 (Year 30-41). It is likely that non-local workers will live in temporary or short-term rental accommodations during construction and return to their home communities during their off time. During operations, which will last approximately 40 years, non-local workers will likely move into the Local Study Area (LSA)/Regional Study Area (RSA) communities with their families and seek permanent housing.

An increase in population within the LSA and RSA is expected as a result of the Project, which has potential to place additional demands on local availability of housing and temporary accommodations. To manage adverse effects on accommodation availability, Canada Nickel will implement hiring practices to employ locally to the extent possible. It will work with education institutions to provide training in skills that will better prepare LSA/RSA residents for Project employment.

Three candidate alternatives were considered:

- No Project accommodation – this alternative involves no on-site or off-site accommodation
- Off-site accommodation – this alternative includes a camp facility in a municipality using existing services and infrastructure
- On-site accommodation – this alternative includes a permanent on-site camp facility

All three alternatives are considered technically and economically feasible. While the three alternatives differ substantially in terms of financial costs, all candidate alternatives are considered feasible in terms of constructability, proven technology and safety.

Step 2 - Examination of Potential Effects on Valued Components

On-site accommodation increases the Project footprint, potentially affecting vegetation and wetlands, birds and bird habitats, wildlife and wildlife habitat. These alternatives would also have potential effects in terms of changes in ambient light, health, and social conditions. A larger footprint could also affect Indigenous interests due to potential effects on heritage resources and the current use of lands and resources for traditional purposes, including harvesting sites, heritage and other cultural sites, and associated traditional activities. On-site accommodation, however, would reduce traffic and associated effects, as workers would reside close to the mine site, reducing daily commutes.

Off-site accommodation would similarly increase the Project footprint with potential effects on vegetation, wetlands, birds and bird habitats, wildlife and wildlife habitat. Additionally, it would require workers to drive to and from the mine site, increasing traffic and associated effects. This alternative could also lead to greater social integration challenges for workers and the local community, as well as increased pressure on existing local infrastructure and services.

No Project accommodation relies on existing infrastructure, allowing the Project footprint to remain smaller. This results in fewer effects on vegetation and wetlands, birds and bird habitats, wildlife and wildlife habitat. By not constructing new accommodation facilities, the Project would avoid additional land disturbance and the associated environmental effects. This alternative also reduces potential effects on Indigenous interests, as there would be less potential disruption to heritage resources and traditional land use. However, relying on existing infrastructure may pose challenges in terms of availability and suitability of housing for workers, potentially leading to increased demand on local housing markets and other services and infrastructure.

Step 3 - Comparative analysis

Table 5.14 provides the comparative analysis between the three 'alternative means' that were considered feasible.

Table 5.13 Accommodations Comparative Analysis

VC/Criteria	Indicator	No Project accommodation	Off-site accommodation	On-site accommodation
Natural Environment				
Geology and Geological Hazards	<ul style="list-style-type: none"> Change in terrain stability 	Neutral – negligible effects on terrain stability from alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on terrain stability from alternative. Effects can be managed through design and standard mitigation.	Neutral – negligible effects on terrain stability from alternative. Effects can be managed through design and standard mitigation.
Soil and Sediment	<ul style="list-style-type: none"> Change in soil quality and quantity 	Advantage – no accommodation camp results in no additional Project footprint.	Disadvantage – Alternative requires larger Project footprint, therefore more potential for effects on soil quality and quantity.	Disadvantage – Alternative requires larger Project footprint, therefore more potential for effects on soil quality and quantity.
Atmospheric Environment	<ul style="list-style-type: none"> Change in ambient air quality 	Disadvantage – Alternative requires workers to commute to and from the mine potentially increasing effects on air emissions	Disadvantage – Alternative requires workers to commute to and from the mine potentially increasing effects on air emissions.	Advantage – Alternative would not require workers to commute to and from the mine.
	<ul style="list-style-type: none"> Change in ambient light 	Advantage – no emissions from this alternative that affect ambient light.	Disadvantage – emissions from this alternative could affect ambient light required for the off-site camp. Effects can be managed through design and standard mitigation.	Disadvantage – emissions from this alternative could affect ambient light required for the on-site camp. Effects can be managed through design and standard mitigation.
Acoustic Environment	<ul style="list-style-type: none"> Change in noise and vibration 	Neutral – negligible effects on noise/vibration related to alternative. Effects can be managed through mitigation, siting or design.	Neutral – negligible effects on noise/vibration related to alternative. Effects can be managed through mitigation, siting or design.	Neutral – negligible effects on noise/vibration related to alternative. Effects can be managed through mitigation, siting or design.
Groundwater	<ul style="list-style-type: none"> Change in groundwater quantity and quality 	Advantage – negligible effects on groundwater associated with alternative. Effects can be readily managed through design and standard mitigation.	Disadvantage – potential effects on groundwater quantity associated with alternative given the need for potable water. Effects can be managed through design and standard mitigation.	Disadvantage – potential effects on groundwater quantity associated with alternative given the need for potable water. Effects can be managed through design and standard mitigation.
Surface Water	<ul style="list-style-type: none"> Change in surface water quantity and quality 	Advantage – negligible effects on surface water quantity associated with alternative. Effects can be managed through design and standard mitigation.	Disadvantage – potential effects on surface water quantity associated with alternative given the need for potable water. Effects can be managed through design and standard mitigation.	Disadvantage – potential effects on surface water quantity associated with alternative given the need for potable water. Effects can be managed through design and standard mitigation.
Vegetation, Riparian and Wetland Environments	<ul style="list-style-type: none"> Change in vegetation communities and species diversity Change in riparian function Change in wetland form and function 	Advantage – no accommodation camp results in no additional Project footprint.	Disadvantage – Alternative requires larger Project footprint, therefore more potential for effects on vegetation, riparian and wetland environments.	Disadvantage – Alternative requires larger Project footprint, therefore more potential for effects on vegetation, riparian and wetland environments.
Fish and Fish Habitat	<ul style="list-style-type: none"> Change in fish habitat Change in fish health 	Neutral - no effects on fish and fish habitat anticipated from alternative.	Neutral - negligible effects on fish and fish habitat from alternative.	Disadvantage - potential effects on fish and fish habitat from alternative due to increase in wastewater would require additional treatment before discharging to environment.
Birds and Bird Habitats	<ul style="list-style-type: none"> Change in habitat Change in mortality risk 	Advantage - no effects on birds and bird habitats anticipated from alternative.	Disadvantage – Alternative requires larger Project footprint for an off-site camp, therefore more potential for effects on birds and bird habitats.	Disadvantage – Alternative requires larger Project footprint for an on-site camp, therefore more potential for effects on birds and bird habitats.
Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> Change in habitat Change in movement Change in mortality risk Change in wildlife health 	Advantage - no effects on wildlife and wildlife habitat anticipated from alternative.	Disadvantage – Alternative requires larger Project footprint for an off-site camp, therefore more potential for effects on wildlife and wildlife habitat.	Disadvantage – Alternative requires larger Project footprint on-site camp, therefore more potential for effects on wildlife and wildlife habitat.

VC/Criteria	Indicator	No Project accommodation	Off-site accommodation	On-site accommodation
Climate Change	<ul style="list-style-type: none"> Change in release of GHG to the environment Change in carbon capture 	Disadvantage – Alternative requires workers to commute to and from the mine potentially increasing GHG emissions.	Disadvantage – Alternative requires workers to commute to and from the mine potentially increasing GHG emissions.	Advantage – Alternative would not require workers to commute to and from the mine.
Health	<ul style="list-style-type: none"> Change in physical health Change in mental health and social wellbeing Change in community safety 	Neutral – potential effects on health related to alternative. Effects can be managed through mitigation, siting or design.	Neutral – potential effects on health related to off-site camp alternative. Effects can be managed through mitigation, siting or design.	Neutral – potential effects on health related to on-site camp alternative. Effects can be managed through mitigation, siting or design.
Social and Economic Conditions				
Services and Infrastructure	<ul style="list-style-type: none"> Change in demand for services and infrastructure Change in accommodation availability Change in demand for transportation infrastructure 	Disadvantage – alternative could increase demand for services and infrastructure associated with commute.	Disadvantage – alternative could increase demand for services and infrastructure associated with commute.	Advantage – no interaction between alternative and services and infrastructure.
Land and Resource Use	<ul style="list-style-type: none"> Change in land use designations and private property Change in recreation Change in resource use 	Advantage – no effects on land and resource use related to alternative anticipated.	Disadvantage – alternative requires larger Project footprint for an off-site camp, therefore more potential for effects on land and resource use.	Disadvantage – alternative requires larger Project footprint for an on-site camp, therefore more potential for effects on land and resource use.
Archaeological and Heritage Sites and/or Features	<ul style="list-style-type: none"> Unauthorized disturbance or destruction of part or all of an archaeological site or sites 	Advantage – no effects on archaeological resources anticipated.	Disadvantage – Given the need for a larger Project footprint for an off-site camp, there could be potential effects on archaeological resources.	Disadvantage – Given the need for a larger Project footprint for an on-site camp, there could be potential effects on archaeological resources.
Economic Conditions	<ul style="list-style-type: none"> Change in employment Change in business Change in provincial economy 	Neutral – no interaction between alternative and economic conditions.	Neutral – limited interaction between alternative and economic conditions.	Neutral – limited interaction between alternative and economic conditions.
Indigenous Peoples				
Indigenous Interests	<ul style="list-style-type: none"> Change to Indigenous and treaty rights (includes Indigenous land and resources use) Change in physical and cultural heritage Change to governance, health, social and economic conditions of Indigenous nations 	Advantage –No potential effects on heritage resources and current use of lands and resources for traditional purposes (including harvesting sites, heritage and other cultural sites, and associated traditional activities) related to alternative.	Disadvantage – Given the need for a larger Project footprint for an off-site camp, there could be potential effects on heritage resources and current use of lands and resources for traditional purposes (including harvesting sites, heritage and other cultural sites, and associated traditional activities) related to alternative. Effects can be managed through mitigation, siting or design	Disadvantage – Given the need for a larger Project footprint for an on-site camp, there could be potential effects on heritage resources and current use of lands and resources for traditional purposes (including harvesting sites, heritage and other cultural sites, and associated traditional activities) related to alternative. Effects can be managed through mitigation, siting or design
Technical / Economic				
Financial Costs	<ul style="list-style-type: none"> Alternative does not result in prohibitively high capital costs and operating costs 	Advantage – alternative is the least expensive.	Disadvantage – alternative requires a larger footprint and construction of off-site camp.	Disadvantage – alternative requires a larger footprint and construction of on-site camp.
Constructability	<ul style="list-style-type: none"> Alternative is constructable while avoiding undue or unnecessary design constraints 	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.	Neutral – alternative can be constructed using conventional construction methods.
Proven Technology	<ul style="list-style-type: none"> Alternative represents a proven technology or has been determined to be effective as evaluated in a testing program 	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.	Neutral – alternative would use proven technology and follow applicable design standards.

VC/Criteria	Indicator	No Project accommodation	Off-site accommodation	On-site accommodation
Safety	<ul style="list-style-type: none"> Alternative can be safely constructed and operated 	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.	Neutral – alternative can be safely constructed and operated.
OVERALL		<p>PREFERRED – This alternative has advantages in terms of potential lower effects on soil, ambient light, groundwater, surface water, vegetation, riparian and wetland environments, birds and bird habitats, wildlife and wildlife habitat, social conditions and Indigenous interests. In addition, this alternative is the least expensive.</p>	<p>NOT PREFERRED – This alternative has several limitations that would ultimately affect the overall ability to implement the Project.</p>	<p>NOT PREFERRED – This alternative has several limitations that would ultimately affect the overall ability to implement the Project.</p>

An accommodations complex (or similar) is not proposed to be developed as part of the Project due to the close proximity of local communities. Canada Nickel anticipates that resident workers who obtain Project employment will commute daily from existing communities/residences, which are located within approximately one hour drive of the Project site, with the possibility that some workers may choose to drive further distances based on their personal preference or circumstances.

Canada Nickel will aim to increase the percentage of the local workforce and reduce the requirement to hire workers from outside the region by providing training opportunities to local residents. As described in the Economic Impact Assessment Report (Appendix C.10 of the Impact Statement), there are nine metal mines within northeastern Ontario in various life phases, including nearing the end of their operational life. Therefore, there could be several hundred persons with mining experience and skills who will become available in the future and may choose to work on the Project.

Steps are also being taken throughout the District of Cochrane to increase the supply of appropriate housing. For instance, the Town of Smooth Rock Falls is encouraging lot development through its Municipal Property Acquisition and Sale Program and is developing its waterfront with the construction of 435 residential units (Town of Smooth Rock Falls 2024). Timmins is hoping to expand two subdivisions by adding 150 new homes and The Town of Cochrane is working on a plan to sell residential lots for as low as \$10 (City of Timmins 2024; Lentz 2023a). In addition, Canada Nickel is engaging with third parties, including Indigenous nations, which may result in an agreement for the provision of Project accommodations.

Canada Nickel will implement hiring practices to employ locally to the extent possible. It will work with education institutions to provide training in skills that will better prepare LSA/RSA residents for Project employment. Canada Nickel will encourage non-local Project construction workers to share rooms at temporary accommodations, including hotels and motels, as well as rental units. Canada Nickel will communicate Project requirements for accommodation to local service providers so they may prepare for periods of increased demand. Northeastern Ontario has experience hosting mining projects and their workforces. In addition, Canada Nickel has plans to undertake an accommodations study and is exploring options to provide housing through third party partners to provide accommodations for Project workers. This study may provide insight into additional mitigation and management measures for Project accommodation. Historically, independent accommodation providers in the region have followed the trends of demand and have had the capacity to provide accommodations for temporary workers when required for large projects. The same is expected in the case of the Project.

Based on the results of the alternatives assessment, no Project accommodation was selected as the preferred alternative, because it has advantages in terms of potentially lower effects on soil, ambient light, groundwater, surface water, vegetation, riparian and wetland environments, birds and bird habitats, wildlife and wildlife habitat. In addition, given that the Project footprint associated with this alternative is smaller compared with the other alternatives, it also has advantages in terms of potential effects on heritage resources and current use of lands and resources for traditional purposes, including harvesting sites, heritage and other cultural sites, and associated traditional activities. However, opportunities for additional accommodations will be explored within already serviced areas, which would reduce potential demand on existing housing and accommodation supply.

5.4 Summary of the Evaluation of Alternatives

The evaluation of alternatives began with the identification of potentially technically and economically feasible alternatives for each Project component. Where multiple feasible alternatives were identified following screening, a short list of alternatives was brought forward for further detailed consideration in the Comparative Analysis step. In addition, TMF and Impoundment Facility alternatives where Project activities involved the potential for the deposition of deleterious substances in waters frequented by fish were assessed following the ECCC Guidelines.

The comparative analysis assessed the 'alternative means' of carrying out the Project for each Project component against a number of 'VCs/criteria' and related indicators. The preferred alternatives are summarized in Table 5.14.

Table 5.14 Summary of Preferred Alternative Means

Project Component	Preferred Alternative Mean(s)
Highway 655/500kV transmission line/rail line corridor	Alternative C1 - West of current route (west of Open Pit and west of Gerry Lake) with alternative C4 being implemented at the beginning of the Project until such time as alternative C1 is operational.
Transportation of concentrate from site	Transportation by rail
Transportation of freight to site	Transportation by truck
Site Access Road	Alternative SA1 - Construction of new access road to Process Plant Area
Energy and Power Sources	Diesel power generators during start of construction until connection to grid becomes available
Potable Water Supply	Groundwater
Process Plant Water Supply	Closed loop
Aggregate Supply Sources	Use a combination of third-party quarries or pits and mined waste rock from the Project Area
Water Crossing Structures and Locations	Combination of culverts, bridges, and other engineered solutions designed to reduce effects while maintaining hydrological connectivity. As the Project progresses, locations and design specifications for each water crossing will be identified.
Water Diversion Methods	Collection and diversion of non-contact water around Project Area
Diversion of the North Driftwood River	Alternative ND2 - Diversion Channel in New Perimeter Valley
Mining Operations	Open Pit
Ore Process Plant Location	East of relocated Hwy 655 (on-site)
Ore Process Plant Design	Ore processing methods are controlled by laboratory testing and analyses to obtain optimal recovery utilizing full scale proven technologies
Impoundment Facility	North of Open Pit
TMF	South of Open Pit with In-Pit Disposal
Tailings Management Techniques to Improve Carbon Sequestration	Active mineral carbonation (IPT Carbonation) in addition to passive carbonation that occurs naturally
Domestic Sewage Waste	At the current stage of Project development, both alternatives (i.e., on-site sewage treatment plant and on-site septic systems) remain viable options.
Water Treatment Technology	Combination of water treatment plant and collection ponds
Effluent Discharge Locations	Distributed discharge locations
Domestic and Industrial Waste	Transported to a licensed facility off-site
Hazardous Waste	Transported to a licensed facility off-site
Decommissioning and Closure	Progressive rehabilitation to start during operations and final closure rehabilitation to start after mining operation ceases
Workforce Hiring	Various hiring practices
Scheduling	Two 12-hour shifts
Accommodation Strategies	No Project accommodation

These preferred alternative means were carried forward for the Project description and effects assessment and collectively form the Project. The methods used to conduct the environmental effects assessment of the Project are described in Chapter 8 (Assessment Methodology). A detailed analysis of potential effects resulting from the Project and identification of mitigation measures was undertaken for the individual VCs in Chapters 10 through 23 and 25 through 28.

5.5 References

ECCC (Environment and Climate Change Canada). 2013. Guidelines for the assessment of alternatives for mine waste disposal. Available at: <https://www.canada.ca/en/environment-climate-change/services/managing-pollution/sources-industry/mining-effluent/metal-diamond-mining-effluent/tailings-impoundment-areas/guidelines-alternatives-mine-waste-disposal.html>

IAAC (Impact Assessment Agency of Canada). 2020a. *Guidance: “Need for”, “Purpose of”, “Alternatives to” and “Alternative means”*. Available at <https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/guidance-need-for-purpose-of-alternatives-to-and-alternative-means.html>

IAAC. 2020b. *Policy Context: “Need for”, “Purpose of”, “Alternatives to” and “Alternative means”*. Available at <https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/need-for-purpose-of-alternatives-to-and-alternative-means.html>

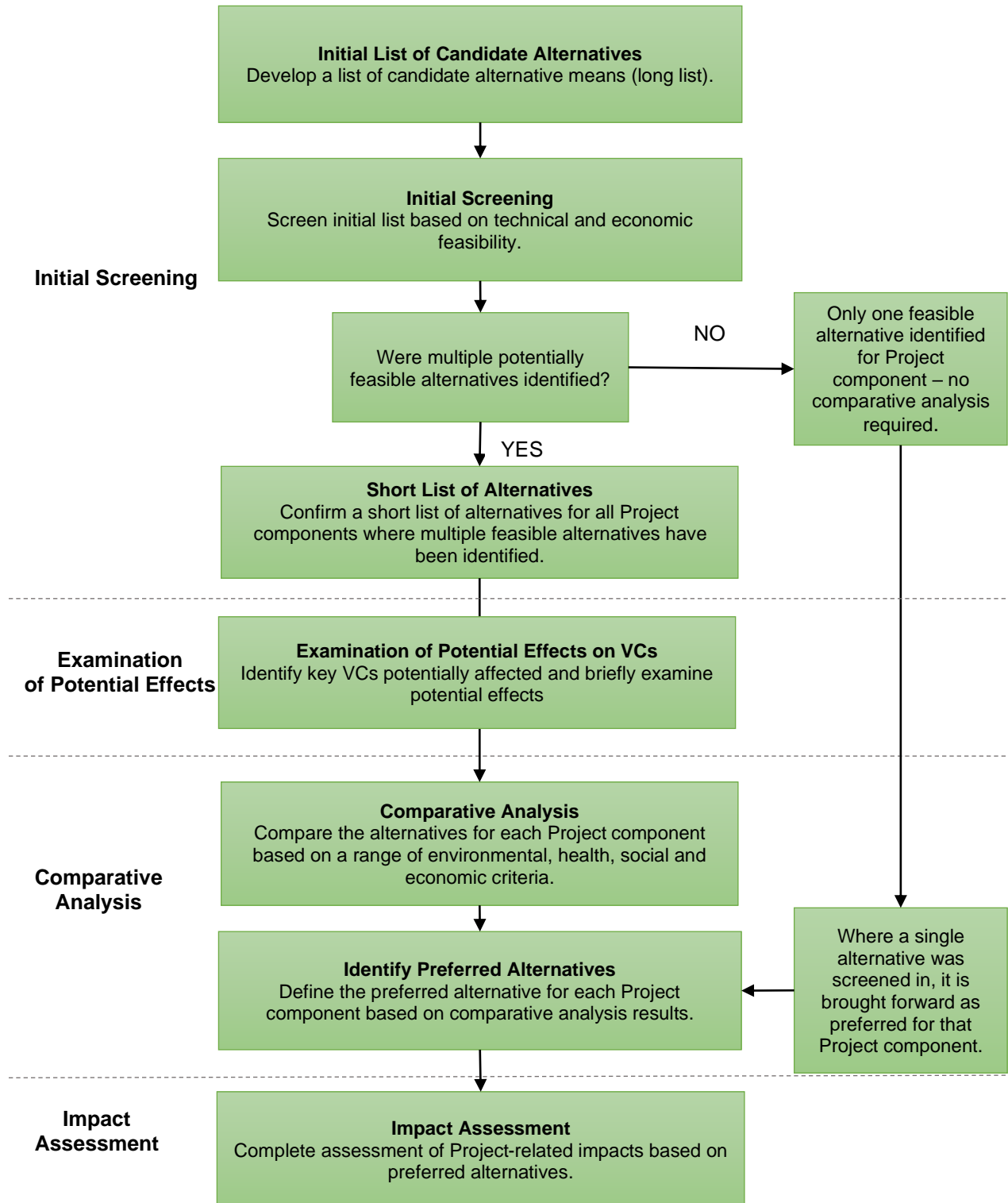
Ministry of Energy Northern Development and Mines. 2022. Ontario’s Critical Minerals Strategy Unlocking potential to drive economic recovery and prosperity 2022-2027. Available at <https://www.ontario.ca/files/2022-03/ndmnr-ontario-critical-minerals-strategy-2022-2027-en-2022-03-22.pdf>

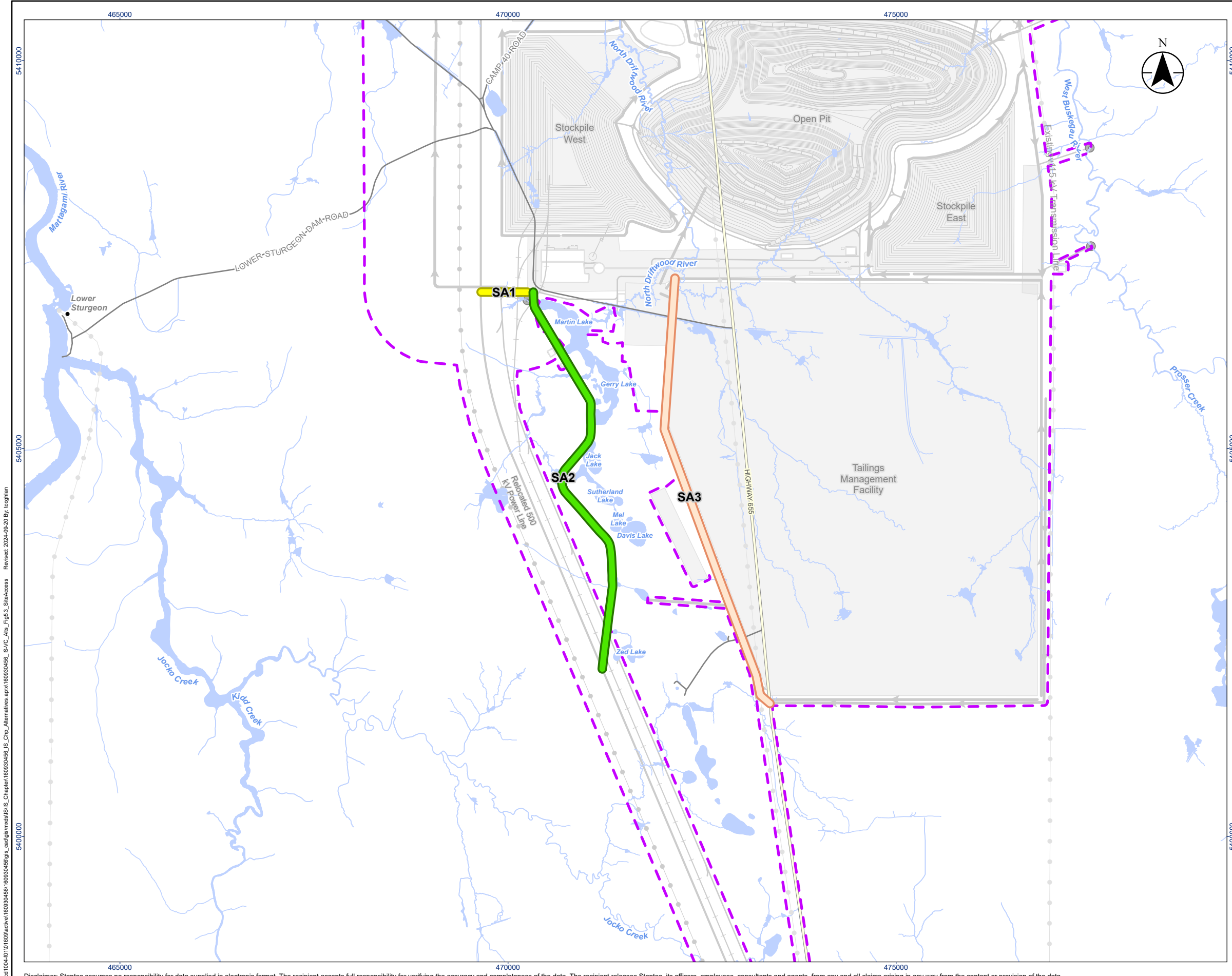
Natural Resources Canada. 2021. Canada Announces Critical Minerals List. <https://www.canada.ca/en/natural-resources-canada/news/2021/03/canada-announces-criticalminerals-list.html>











Railway Association of Canada. 2024. Rail is Green Transportation. <https://www.railcan.ca/101/rail-is-green-transportation/>

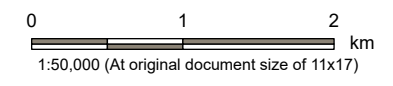
5.6 Figures

Figure 5.1 Alternatives Evaluation Process Flow Chart





- Legend**
-  Project Area
 - Alternatives**
 -  SA1
 -  SA2
 -  SA3
 -  Proposed Project Components
 - Base Features**
 -  Major Road
 -  Minor Road
 -  Existing Transmission Line
 -  Watercourse
 -  Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location: Timmins, Ontario
 160930456 REVA
 Prepared by toghlan on 2024-09-20

Client/Project:
 Canada Nickel Company (CNC)
 Crawford Nickel Project

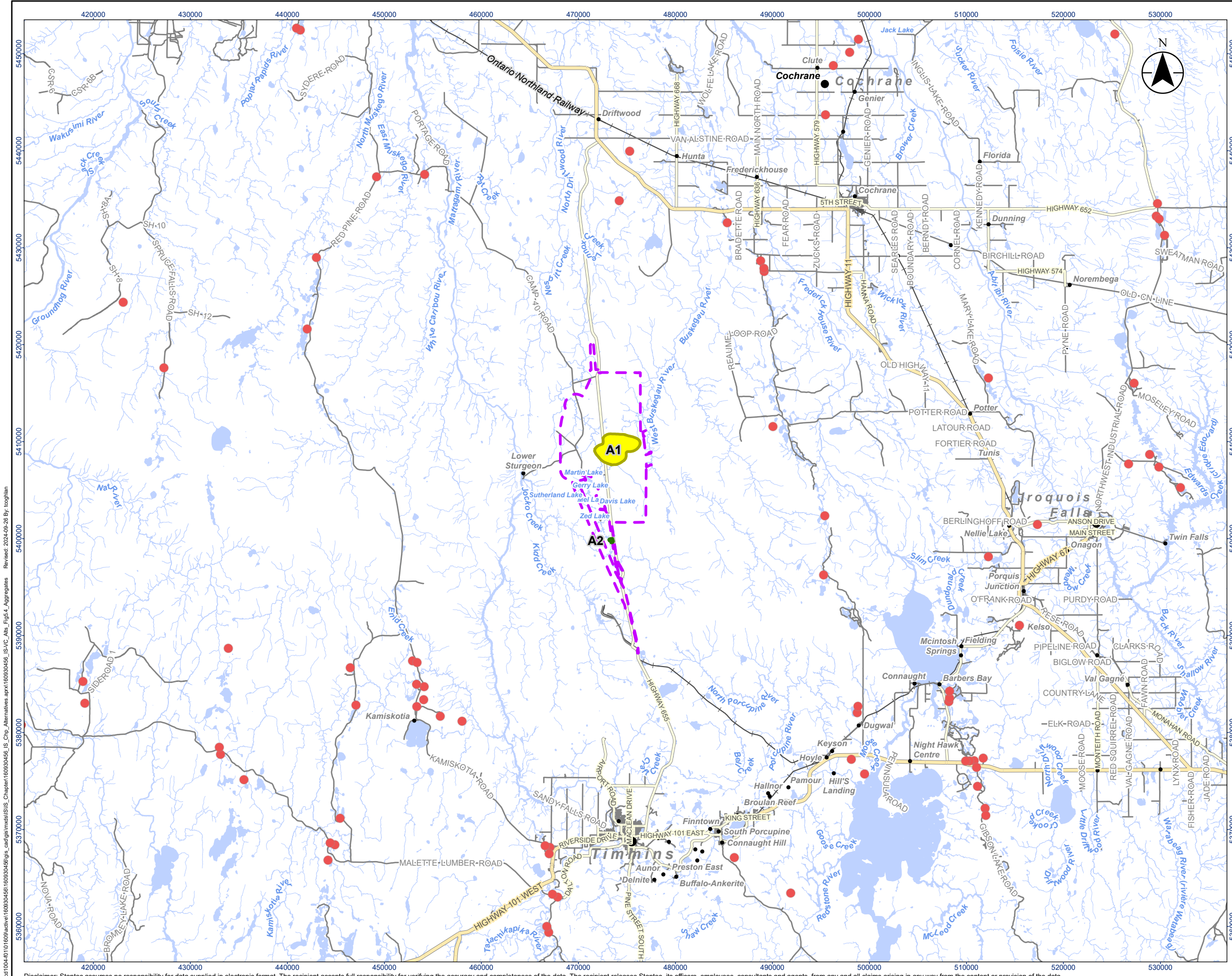
Figure No.

5.3

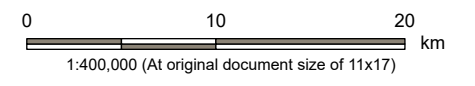
Title

Site Access Alternatives

V:\1004-10\160930456\160930456\GIS_Cad\gis_cad\gis_cad\gis_cad\gis_cad\160930456_IS_VC_Abs_Figs3_SiteAccess_Revise1_2024-09-20_By: toghlan



- Legend**
- Project Area
 - Other Aggregate Extraction Location
- Alternatives**
- A1
 - A2
- Base Features**
- Expressway / Highway
 - Major Road
 - Minor Road
 - Railway
 - Watercourse
 - Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



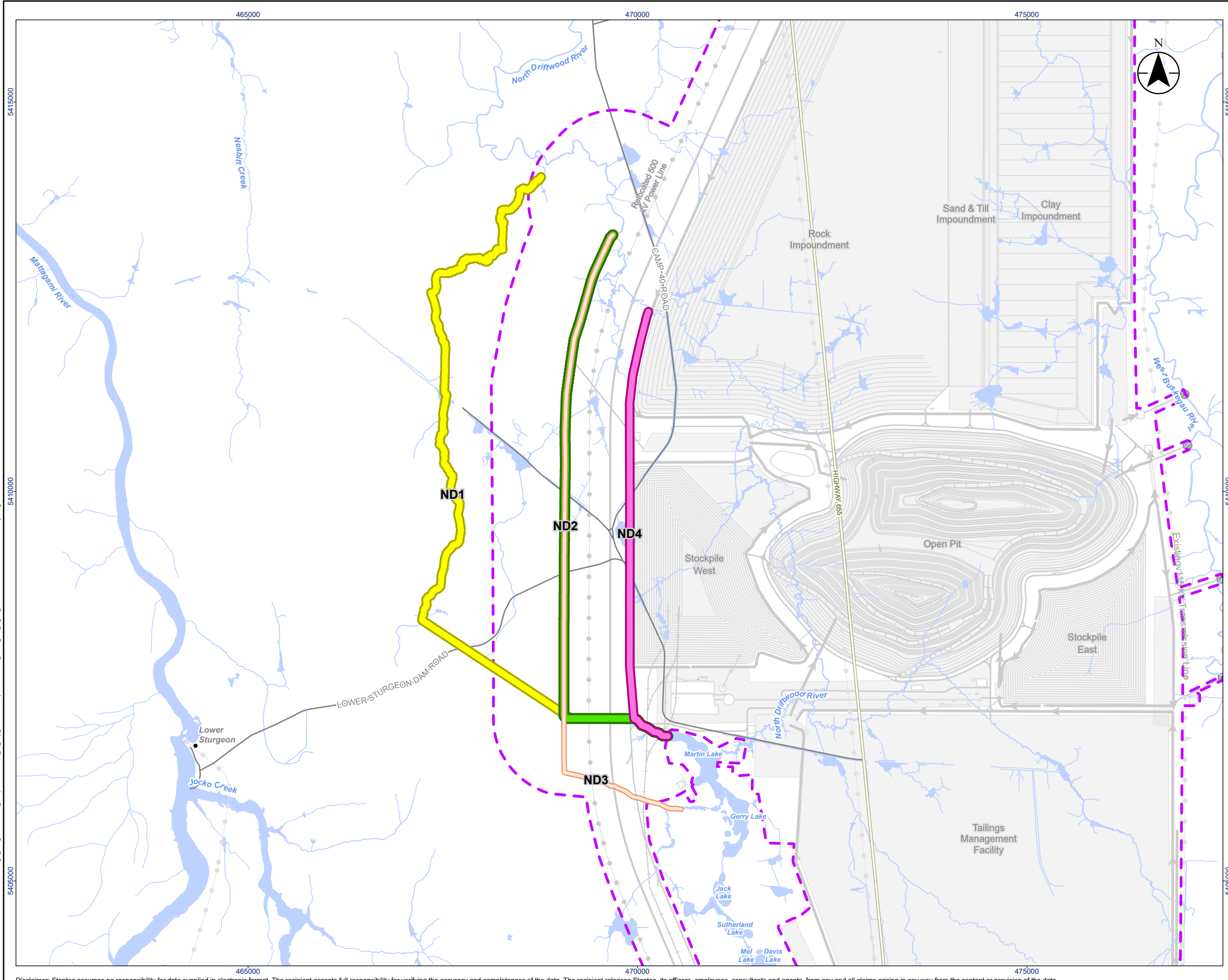
Project Location: Timmins, Ontario
 160930456 REVA
 Prepared by toghlan on 2024-09-26

Client/Project:
 Canada Nickel Company (CNC)
 Crawford Nickel Project

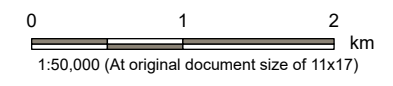
Figure No.
5.4

Title
Aggregate Supply Sources Alternatives

V:\1004-10\1009\active\160930456\160930456\gis_cad\gis\mxd\160930456_160930456_IS_VC_Ans_Figs4_Aggregates
 Revised: 2024-09-26 By: toghlan



- Legend**
- Project Area
 - Alternatives**
 - ND1
 - ND2
 - ND3
 - ND4
 - Proposed Project Components
 - Base Features**
 - Major Road
 - Minor Road
 - Existing Transmission Line
 - Watercourse
 - Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 17N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location: Timmins, Ontario
 160930456 REVA
 Prepared by tooghlan on 2024-09-20

Client/Project:
 Canada Nickel Company (CNC)
 Crawford Nickel Project

Figure No.
5.5

Title
North Driftwood River Diversion Alternatives

V:\1004-101\1009\active\160930456\160930456\gis_cad\gis\mxd\160930456_IS_Chp_Alternatives.aprx\160930456_IS_Chp_Als_Figs_5_Diversion
 Revised: 2024-09-20 By: tooghlan
 5415000
 5410000
 5405000

